Bureau of Air Quality

South Carolina Department of Health and Environmental Control

State of South Carolina:
Network Description and Ambient Air Network Monitoring Plan

Calendar Year 2014

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South Carolina Department of Health and Environmental Control

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CERTIFICATION

This document contains the planned changes and final description of the sites and monitors of the South Carolina Ambient Air Monitoring Network for criteria pollutants and related parameters for calendar year 2014. The South Carolina Department of Health and Environmental Control (DHEC) certifies that the network described herein meets or exceeds the minimum requirements needed to support the State Implementation Plan, national air quality assessments and policy decisions as required in 40 CFR Part 58, Ambient Air Quality Surveillance, at the time of submittal to the United States Environmental Protection Agency (EPA), Region 4. Due to circumstances that may arise during the implementation of the plan in 2013 and during the 2014 monitoring year, some elements of the network may require modification. A notification of modifications will be posted on the DHEC website and provided to EPA Region 4. Where necessary, a request for approval of deviations from this plan and supporting documentation will be submitted to EPA Region 4.

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Acronyms

AQCR – Air Quality Control Region

AQI – Air Quality Index

AQS – Air Quality System

BAQ – Bureau of Air Quality

BC – Black Carbon

CAAA – Clean Air Act Amendment

CBSA – Core-Based Statistical Area

CFR – Code of Federal Regulation

CSA – Combined Statistical Area

CSN – Chemical Speciation Network

CMS – Continuous Monitoring Site

DAQA – Division of Air Quality Analysis

DHEC- South Carolina Department of Health and Environmental Control

EPA – Environmental Protection Agency

FDMS – Filter Dynamics Measurement System

FEM – Federal Equivalent Method

FRM – Federal Reference Method

GC/MS – Gas Chromatography / Mass Spectroscopy

GFAA – Graphite Furnace Atomic Absorption Spectrometry

HPLC – High Performance Liquid Chromatography

IC – Ion Chromatography

IMPROVE – Interagency Monitoring of Protected Visual Environments

ICP/MS – Inductively Coupled Plasma Mass Spectroscopy

LAC – Light-Absorbing Carbon

MET – Meteorology

MOA – Memorandum of Agreement

MSA – Metropolitan Statistical Area

µSA – Micropolitan Statistical Area

NAAQS – National Ambient Air Quality Standards

NATTS- National Air Toxics Trends Site

NADP-MDN – National Atmospheric Deposition Program Mercury Deposition Network

NATA – National Air Toxics Assessment

NCore – National Core Monitoring Network

NPAP – National Performance Audit Program

NWS – National Weather Service

PEP – Performance Evaluation Program

PSD – Prevention of Significant Deterioration

PTFE - Polytetrafluoroethylene

PUF – Polyurethane Foam

QA – Quality Assurance

QAPP – Quality Assurance Project Plan

QC – Quality Control

SAMWG – Standing Air Monitoring Working Group

DHEC – South Carolina Department of Health and Environmental Control

SLAMS – State and Local Air Monitoring Station

SPM – Special Purpose Monitor

TBD - To be determined

TEOM – Tapered Element Oscillating Microbalance

TOT – Thermal Optical Transmittance

TSP – Total Suspended Particulate

UV – Ultraviolet

WGS84 – World Geodetic System of 1984 revised in 2004

XRF – X-ray Fluorescence Spectroscopy

TABLE OF CONTENTS

Introduction

The South Carolina Department of Health and Environmental Control (DHEC) or its predecessors have operated an air quality monitoring network in South Carolina since 1959. During that time, the network has continually evolved to meet the requirements and needs of DHEC's Air Program and to comply with federal requirements. In 2014 the network will be comprised of 104 monitors and samplers at 33 sites.

In October, 2006, the United States Environmental Protection Agency (EPA) published revisions to the ambient monitoring regulations (71 FR 61236, October 17, 2006) requiring quality assurance (QA), monitor designations, minimum requirements for both number and distribution of monitors among metropolitan statistical areas (MSAs) and probe siting changes. The regulation also included the requirement for an annual monitoring network plan and periodic network assessments.

Monitor designations include the State and Local Air Monitoring Station (SLAMS), special purpose monitoring (SPM) and the National Core Monitoring Network (NCore). The SLAMS air monitoring network is specific for the criteria pollutants, those pollutants for which National Ambient Air Quality Standards (NAAQS) have been established. In addition to a SLAMS network, the air monitoring network includes SPM for air toxics, particulate, mercury, criteria pollutants, precipitation and meteorology. NCore is a national multi-pollutant network that utilizes advanced measurement systems for particles, pollutant gases and meteorology. It provides data to long-term trends of criteria and non-criteria pollutants and to support air quality model evaluation, scientific studies and ecosystem assessments.

This plan covers the eighteen month period from July 1, 2013 through December 31, 2014. This period includes a 6 month implementation period during which sites indicated as 'New' will be identified, secured and prepared for the installation of monitoring equipment. It is expected that any monitoring indicated as 'New' or 'To be established' will be installed, calibrated and operating in 2014 with the exception of some ozone monitors which may begin operation at the start of the South Carolina Ozone Monitoring Season (April-October). Stakeholder groups have committed to assist in identifying and securing access to suitable locations. These efforts will continue in this and in subsequent monitoring plans as DHEC continues to identify new monitoring needs.

The annual Network Description and Ambient Air Monitoring Plan , as required and described in 40 CFR Part 58.10, Annual Monitoring Network Plan and Periodic Network Assessment, must contain the following information for each monitoring station in the network:

- The Air Quality System (AQS) site identification number for existing stations
- The location, including street address and geographical coordinates, for each monitoring station
- The sampling and analysis method used for each measured parameter
- The operating schedule for each monitor
- Any proposal to remove or relocate a monitoring station within a period of eighteen months following the plan submittal
- The monitoring objective and spatial scale of representativeness for each monitor
- The identification of any sites that are suitable for comparison against the $PM_{2.5}$ NAAQS
- The MSA, Core-Based Statistical Area (CBSA), Combined Statistical Area (CSA) or other area represented by the monitor

This document constitutes the South Carolina Air Monitoring Network Plan and is organized into two main parts:

- **Network Summaries:** A table which presents the total number of sites and monitors for the State, including a list of all proposed changes to the current network

- **Air Monitoring Station Description:** An outline of the designations, parameters, monitoring methods and the purpose for each monitor at the site

The South Carolina Ambient Monitoring Network (Monitoring Network) will be reviewed annually. Planned changes will be described in this Network Description and Ambient Air Monitoring Plan and provided for public review and comment prior to submission to the EPA Region 4 Administrator.

2014 Network Description and Ambient Air Monitoring Plan: Public Participation Opportunities

In anticipation of the need for an updated monitoring plan, heightened public interest and potential impact of the monitoring regulation changes, DHEC's Air Program solicits involvement from both internal (to DHEC) and external workgroups.

Individuals that had expressed interest in the development of the ambient air monitoring network were notified of the availability of the plan and were invited to provide comments. This group consists of representatives from the business, environmental and health communities.

Other opportunities for public involvement include:

- A webpage maintained for publication and access to draft and reference documents and announcements[1].
- Availability of the proposed 2014 Network Description and Ambient Air Network Monitoring Plan **for public review and comment ran from May 31, 2013 to June 29, 2013.** All recorded participants who registered in the outreach and discussion activities were notified when the plan became available for review.

DHEC is committed to continuing the involvement and participation opportunities in the development of the annual revisions of the Network Description and Ambient Air Network Monitoring Plan and the periodic assessments of the air quality surveillance system.

Network Operation

The primary responsibility for the operation of the South Carolina Ambient Air Monitoring Network is assigned to the Division of Air Quality Analysis in the Bureau of Environmental Services (Division). The Division establishes, maintains and operates the sites and instruments that make up the network and performs the analysis of samples collected as part of routine monitoring or special projects. Data generated by the network for comparison to the NAAQS is verified to be accurate and reported by the Division and stored in the national AQS database.

Criteria pollutant monitoring for the purpose of comparison to the NAAQS is performed using EPA designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM) to ensure the precision and accuracy of the measurements across the air quality surveillance system.

Regular calibration and audits of the measurement systems are performed to verify that the instruments are operating correctly and data being collected is accurate. The QA activities supporting the Monitoring Network meet or exceed the QA requirements defined in 40 CFR Part 58 Appendix A (Quality Assurance Requirements for SLAMS, SPMs and PSD Air Monitoring).

Raw data is collected hourly from sites across the state and provided to internal data users (forecasters and data analysts) and to the AIRNow database for presentation to the public. Before the data is submitted to AQS, it is verified to be accurate through review of the instrument Quality Control (QC) and QA performance documentation.

Instrument QA/QC alone is not sufficient to assure monitoring data quality. In addition to periodic site assessments, DHEC conducts additional visits of monitoring sites to enable comparison with applicable siting criteria.

It is DHEC's intent that all criteria pollutant monitors and samplers be sited and operated in

[1] http://www.scdhec.gov/environment/baq/AmbientAirMonitoring/

accordance with the requirements of 40 CFR Part 58 and Appendices A (Quality Assurance), C (Methods), D (Network Design) and E (Probe Siting Criteria) and the data collected by these samplers and monitors is suitable for comparison to the NAAQS. DHEC further intends to assure that the samplers and monitors comply with as many of the recommendations contained within the regulations and applicable guidance documents as is possible.

An element of the Quality System[2] employed by the Division is periodic assessments of systems and monitor performance. As the primary QA organization for ambient air monitoring activities, the Division operates under the approved Environmental Quality Control Quality Assurance Management Plan, the Ambient Air Quality Monitoring Quality Assurance Project Plan and approved plans for specific projects. EPA Region 4 provides periodic Technical Systems Audits of sampling and analytical methods, network operation, data collection and reporting and QA activities at their discretion or at the request of DHEC's Air Program. EPA Region 4 may conduct audits of any component of the operation of the network or quality management system. The Division also participates in the National Performance Audit Program (NPAP) and the Performance Evaluation Program (PEP) administered by EPA to provide independent audits of criteria pollutant monitoring and performance.

[2] The Quality System is the means by which DHEC implements the quality management process through the Quality Assurance Management Plan for SC DHEC, July, 2008.

Station Description Content

Specific siting information for each site and monitor is stored in the EPA's Ambient Quality System (AQS), the national ambient air database. The AQS Site Description includes the exact location of the site, local and regional population and description of the site location, monitor types and monitoring objectives. This site and monitor information is routinely updated whenever there is a change in site characteristics or pollutants monitored.

The AQS is used as the primary repository for all South Carolina ambient monitoring data including site descriptions. All ambient monitoring data is stored in AQS, including non-NAAQS parameters, ambient toxics, total suspended particulate and supporting QA data.

Station Description

Each network station description contained in this document includes a Site Description and Monitor Details. These sections may include the following information:

Site Description

The header for each site includes:

- **Site Name**
- **Core Based Statistical Areas** (CBSA) as defined by the US Census. (November 2009).[3]
- **AQS Site ID:** The unique site identification number used in AQS in the form of 45-ccc-ssss where:
    - **45** is the federal identification code for SC,
    - **ccc** is the county identification code; and
    - **ssss** is the site identification code within the county.
- **Location:** Typically the street address of the site where available.
- **County:** County in which the site is located.
- **Coordinates:** Listed in decimal degrees, Latitude (N) then Longitude (W) using WGS84 projection.
- **Date Established:** The date when each existing monitoring station was established is shown in the description. For new stations proposed in this plan, a date is provided when it is expected for the station to be in operation. Individual monitors at a site may have differing start and stop dates.
- **Site Evaluation (most recent date visited):** Each monitoring station in the network is periodically visited to determine whether all required probe exposure criteria for monitors are met. If necessary, corrective action is scheduled to address deficiencies. If a monitoring site has not yet been evaluated, it will be denoted with the word "PENDING". Auditors may visit sites to provide an additional, independent QA check on the site evaluations. When an additional independent check has been conducted, the date of the visit will be noted next to the date of the latest site evaluation and contained within parentheses.

Monitor Details

In a table associated with each site, the parameters monitored at that site are listed along with descriptive information associated with that parameter.

- **Parameter**

Criteria (compounds for which a NAAQS has been established), non criteria and/or supporting parameters (primarily meteorological measurements) measured at the site are listed.

- **Scale**

Each monitor or sampler in the monitoring network is described in terms of the approximate physical dimensions of the air parcel nearest the monitoring station throughout which pollutant concentrations are expected to be reasonably similar. This is most often referred to as the *Scale* of the monitor. Different pollutants monitored at the same location may represent different scales depending on the characteristics of the pollutant.

[3] The US Census Bureau periodically adjusts CBSA names and boundaries. This plan uses the latest available revision.

Area dimensions or scales of representativeness used in the network description are:

(a) Microscale

Air volumes associated with area dimensions ranging from several meters up to about 100 meters.

(b) Middle scale

Areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometers

(c) Neighborhood scale

Extended areas of a city that have relatively uniform land use with dimensions ranging from 0.5 to 4.0 kilometers

(d) Urban scale

Citywide or equivalent rural areas with dimensions ranging from 4 to 50 kilometers

(e) Regional scale

Areas ranging from 50 to hundreds of kilometers in diameter

The true representative area may best be described by an irregular shape of the approximate dimensions indicated above accounting for local sources and differing land use.

The representative scale of a monitor is closely associated with the objective of the monitoring.

Objective

The ambient air monitoring network is designed to meet three primary objectives:

1) Provide air pollution data to the public in a timely manner. Near real-time data is made available on the internet through AIRNow and Air Quality Index (AQI) reporting and forecasting in the major metropolitan areas.

2) Support compliance with ambient air quality standards and emissions strategy development. Monitors are operated to measure concentrations for comparison to NAAQS and to provide information to aid in the development of strategies to improve air quality.

3) Support air pollution research studies. Data from the monitoring network support greater understanding of the impacts and effects of ambient air pollution.

Individual monitors within a monitoring network that support these basic objectives generally serve one or more of the following purposes:

- Determine highest concentrations of pollutants
- Determine representative concentrations in areas of high population density
- Determine impact on air quality of significant sources or source categories
- Determine general background concentrations
- Determine extent of regional pollutant transport
- Determine welfare-related impacts in more rural and remote areas (ex. visibility impairment and impacts to vegetation)

The design intent in siting stations is to correctly match the area represented by the sample of monitored air with the area dimensions most appropriate for the monitoring objective of the monitor. The relationship of appropriate scale to the six basic purposes are:

Monitoring Purpose	**Siting Scale**
Highest concentration	Micro, Middle, Neighborhood
Population	Neighborhood, Urban
Source impact	Micro, Middle, Neighborhood
General/background	Neighborhood, Urban, Regional
Regional transport	Urban, Regional
Welfare-related impacts	Urban, Regional

Monitor and sampler data is regularly reviewed to assure the assigned scale is correct and appropriate for the intended objective.

Designation

State and Local Air Monitoring Stations: (SLAMS) The required and long term criteria pollutant monitors described in the air quality monitoring network are designated **SLAMS**. EPA requirements for air quality surveillance systems provide for the establishment of a network of monitoring stations designated SLAMS that measure ambient concentrations of those pollutants for which standards have been established. These stations must meet requirements that relate to four major areas: QA, monitoring methodology, sampling interval and siting of instruments and instrument probes.

Special Purpose Monitors (SPM): Monitors in the air quality surveillance network not designated SLAMS are SPM. The SPM support investigations addressing complaints, areas and pollutants of concern, network refinement, modeling verification and compliance. These monitors are committed to investigation and projects as described in the associated Quality Assurance Project Plan (QAPP). They may be located as separate monitoring stations or be included at existing monitoring locations. Monitoring data will be reported to AQS where possible. Siting and probe exposure will conform to all requirements for SLAMS monitors whenever possible.

Both SLAMS and SPM data may be used in the reporting of an area's Air Quality Index.

Air Quality Index (AQI): The AQI is a method of reporting that converts concentration levels of pollution to a simple number scale of 0-500. Index reporting is required for all urban areas with a population exceeding 350,000. Intervals on the AQI scale are related to potential health effects of the daily measured concentration of the measured pollutants. All stations in a metropolitan area provide data for daily index reporting. Data collected from continuous monitors for Ozone and $PM_{2.5}$ monitors is collected hourly and reported as AQI maps on EPA's AIRNow website. A daily AQI is provided for the areas in and around Aiken, Charleston, Columbia, Florence/Darlington, Greenville-Spartanburg, and York/Chester/Lancaster.

Probe Height

The monitor or sampler probe is the point where ambient air enters the analytical or sample collection system. Ideally, air would be sampled approximately at nose height, but due to operational, exposure and security considerations, air may be sampled further from ground level. Proper probe height is specified in the monitoring regulations (typically between 2 and 15 meters) and is checked as part of the periodic site evaluations.

Analysis Methods

All sampling and analytical procedures used for comparison of ambient concentrations of criteria pollutants to the NAAQS will use designated Federal Reference Methods (FRM) or Federal Equivalent Methods (FEM). Where appropriate for specific monitoring objectives, well characterized non-equivalent methods may be used.

- **Particulate Matter ≤ 10 microns (PM_{10})**

PM_{10} samplers operated by DHEC are designated as either FRM or FEM samplers and are operated according to the requirements set forth in 40 CFR Part 50 and 40 CFR Part 58. Intermittent samplers collect a 24-hour sample no less than every sixth day on a quartz filter. The filter is conditioned and weighed before and after the sample run. The gain in weight in relation to the volume of air sampled is calculated in micrograms per cubic meter ($\mu g/m^3$). The quartz filters are equilibrated before each weighing for a minimum of 24 hours at a 20-23°C mean temperature and a 30-40 percent mean relative humidity.

Continuous PM_{10} samplers provide 24-hour concentration measurements every day. During sampling, ambient air passes through an inlet designed to pass only particles smaller than 10 microns in diameter. After exiting the inlet, the sample stream is sent through a mass transducer to determine instantaneous and total flow. Particulate in the sample stream passes through a Teflon-coated glass fiber filter. This filter is weighed every two seconds. The difference between the current filter weight and the previous

weight gives the total mass of the collected particulate for that period. The mass concentration is computed by dividing the total mass gained by the flow rate. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

- **Particulate Matter ≤ 2.5 microns ($PM_{2.5}$)**

All $PM_{2.5}$ samplers operated by DHEC are designated FRM samplers. Manual samplers are operated per the requirements set forth in 40 CFR Part 50, Appendix L. Samples are collected on 46.2 millimeter Polytetrafluoroethylene (PTFE) filters over a 24-hour sampling period. Air flow through the filter is maintained at 16.7 liters per minute. The flow rate must not vary more than +/-5 percent for five minutes over a 24-hour sample period at actual ambient temperature and pressure. Samples are retrieved within 96 hours of the end of the sample run and are kept cool (4°C or cooler) during transit to meet the thirty-day limit for final weighing.

The PTFE filters are equilibrated and weighed before and after the sample run for a minimum of 24 hours at a controlled atmosphere of 20-23°C mean temperature and 30-40 percent mean relative humidity. Filters are used within thirty days of initial weighing. Filters must be re-weighed within thirty days of the end of the sample run if kept at 4°C or cooler. The gain in weight in relation to the volume of air sampled is calculated in $\mu g/m^3$.

Unless designated FEM, continuous $PM_{2.5}$ monitors provide hourly measurements for AQI reporting unless designated FEM, do not provide concentration data currently suitable for comparison to the NAAQS. During monitoring, ambient air passes through an inlet system designed to pass only particles smaller than 2.5 microns in diameter. After exiting the inlet, the sample stream is sent through a mass transducer to determine instantaneous and total flow. Particulate in the sample stream is captured by a Teflon-coated glass fiber filter. This filter is weighed every two seconds. The difference between the current filter weight and the previous weight gives the total mass of the collected particulate for that period. The mass concentration is computed by dividing the total mass gained by the flow rate. Data is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

<u>$PM_{2.5}$ Speciation sampling and analysis</u>

In addition to operating $PM_{2.5}$ samplers that allow measurement of only $PM_{2.5}$ mass concentration, DHEC also operates $PM_{2.5}$ speciation samplers that collect samples that are analyzed to determine the chemical makeup of $PM_{2.5}$. Samples are collected on a set of three cartridges over a 24-hour sampling period. The individual cartridges contain denuders and filters designed to efficiently capture the major components of $PM_{2.5}$.

After collection, the samples are shipped in ice chests to the EPA contract laboratory for analysis. At the laboratory, the samples are analyzed using thermal optical analysis (for carbon), ion chromatography and x-ray fluorescence (for metals) to determine the presence and concentration of specific compounds. Sample results are stored in AQS.

- **Sulfur Dioxide (SO_2)**

Instruments used to continuously monitor sulfur dioxide concentrations in the atmosphere employ the FEM Ultraviolet (UV) fluorescence method. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

Calibration of these instruments is done dynamically using EPA protocol gas mixtures containing a known concentration of sulfur dioxide in nitrogen. This gas is diluted to give varying known concentrations of sulfur dioxide. These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Carbon Monoxide (CO)**

Continuous monitoring for carbon monoxide is performed by use of the FRM non-dispersive infrared correlation method. Data is stored locally

on redundant data acquisition systems and recovered hourly by the Division's automated central data acquisition system.

Calibration of the instrument is done dynamically using EPA Protocol gas mixtures containing a known concentration of carbon monoxide in air. The gas is diluted to give varying known concentrations of carbon monoxide. These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Ozone (O_3)**

Ozone is monitored using the FEM Ultraviolet (UV) photometry method. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by the Division's automated central data acquisition system.

Monitors are routinely calibrated using portable ozone transfer standards. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Nitrogen Dioxide (NO_2)**

The FRM chemiluminescence and UV methods are used in monitoring the nitrogen dioxide concentration in the ambient air. The continuous data output from the instrument is stored locally on redundant data acquisition systems and recovered hourly by an automated central data acquisition system.

Calibration of the instrument is done dynamically using EPA protocol gas mixtures containing a known concentration of nitric oxide in nitrogen. The gas is diluted to give varying known concentrations of nitric oxide. An ozone generator and converter are used to convert nitric oxide (NO) to nitrogen dioxide (NO_2). These known concentrations are supplied to the instrument, which is adjusted so that the instrument output corresponds with the specific concentrations. Calibration curves are prepared for each instrument and each measurement is automatically compared to this curve before entry into the data acquisition system.

- **Lead**

Lead concentrations are determined from the analysis of total suspended particulate collected using high volume particulate samplers as described in 40 CFR Part 50 Appendix G. Particulate samples are acid extracted to dissolve the metals. The lead content is determined using Flameless (Graphite Furnace) Atomic Absorption spectrometry.

Sampling Frequency

Measurements of the parameters related to air quality are performed using sampling and continuous monitoring. Sampling frequency is the indicator of how often a measurement is made and reported.

Sampling typically involves collection of a sample over a period (typically 24 hours, midnight to midnight) and delivery of the sample to the laboratory for preparation and analysis. Samples are collected every day (1:1), every third day (1:3), every sixth day (1:6) and, for some projects, every twelfth day (1:12) depending on the data quality objectives necessary for the project. Results of the analysis are reported as averages for the period. The EPA publishes 1:3 and 1:6 day sampling schedules used nationwide and by the Monitoring Network. [4]

Monitoring typically uses on-site analyzers that continuously sample the air and measure the pollutant of interest. Results of the analysis are reported as hourly averages.

Changes for 2014

Any planned changes in parameters monitored, the configuration, or operations at the site planned for 2014 are described herein and summarized in the Summary of 2014 Network Changes. Unless otherwise indicated, changes at a site including the beginning of new monitoring activity will be effective January 1, 2014. Ozone monitoring for 2014 at new or special project sites may start at the beginning of the ozone monitoring season (April-October).

[4] http://www.epa.gov/ttn/amtic/calendar.html

Network Summary: Calendar Year 2014 Air Monitoring Stations

Region	Sites	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	TSP/Lead	O_3	SO_2	NO_2/NO/NO_y	CO	Sulfate	BC	Carbonyls	SVOC	VOC	Mercury	Precip Chem.	Precip.	*MET
Augusta-Richmond County MSA	2	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Charleston-N. Charleston MSA	5	3	1	1	1	0	2	2	2	0	1	1	0	0	0	0	0	0	1
Charlotte-Concord-Gastonia MSA	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Columbia MSA	7	4	2	1	3	1	3	3	3	1	0	1	2	3	0	2	2	2	3
Florence MSA	5	1	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0
Greenville-Anderson-Maudlin, SC MSA	5	3	1	1	1	0	4	1	1	0	1	1	0	0	0	0	0	0	1
Spartanburg MSA	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Rest of State	6	1	3	1	3	0	5	1	0	0	0	1	1	1	1	0	2	2	1
TOTALS	33	14	9	4	8	4	19	8	6	1	2	4	3	4	1	2	4	4	7

This summary table presents the elements of the South Carolina Network Description and Ambient Air Monitoring Plan after implementation of changes described in this plan.

*MET data includes wind speed and wind direction.

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DRAFT 2012 Criteria Pollutant Design Values

This section presents the latest available design values for the South Carolina criteria pollutant monitoring network.

Site ID	County	Site Name	Ozone (ppm)	$PM_{2.5}$ Annual ($\mu g/m^3$)	$PM_{2.5}$ 24-hour ($\mu g/m^3$)	PM_{10} (# Expected Exceedances)	SO_2 1-hour (ppb)	NO_2 1-hour (ppb)	NO_2 Annual (ppb)	CO 8-hour (ppm)	CO 1-hour (ppm)	Lead ($\mu g/m^3$)
001-0001	Abbeville	Due West	0.064									
003-0003	Aiken	Jackson Middle School	0.064									
007-0005	Anderson	Big Creek	0.073									
015-0002	Berkeley	Bushy Park	0.064									
019-0003	Charleston	Jenkins Avenue				0.0	18	37*	6.60			0.01
019-0046	Charleston	Cape Romain	0.066				10	11*	1.62			
019-0048	Charleston	FAA		9.3*	23*							
019-0049	Charleston	Charleston Public Works		8.9	22							
021-0002	Cherokee	Cowpens	0.070									
025-0001	Chesterfield	Chesterfield	0.065	9.3*	20*	0.0						
029-0002	Colleton	Ashton	0.063									
031-0003	Darlington	Pee Dee	0.070									
037-0001	Edgefield	Trenton	0.063	9.8	20							
041-0003	Florence	Williams		10.4	22							
041-8001	Florence	JCI Railroad										0.04
041-8002	Florence	JCI Entrance										0.02
041-8003	Florence	JCI Woods										0.01
043-0006	Georgetown	Georgetown CMS										
043-0011	Georgetown	Howard High #3				0.0						
045-0015	Greenville	Greenville ESC		10.9	23	0.0	11	48*	8.77*	1.2	1.5	0.01
045-0016	Greenville	Hillcrest	0.069	9.9*	19*							
045-1003	Greenville	Famoda Farms	0.066									
063-0008	Lexington	Irmo		11.1	23		55					
063-0009	Lexington	Cayce CMS				0.0						

Site ID	County	Site Name	Ozone (ppm)	$PM_{2.5}$ Annual ($\mu g/m^3$)	$PM_{2.5}$ 24-hour ($\mu g/m^3$)	PM_{10} (# Expected Exceedances)	SO_2 1-hour (ppb)	NO_2 1-hour (ppb)	NO_2 Annual (ppb)	CO 8-hour (ppm)	CO 1-hour (ppm)	Lead ($\mu g/m^3$)
063-0010	Lexington	Cayce City Hall				0.0						
073-0001	Oconee	Long Creek	0.064	8.6*	20*		5					
077-0002	Pickens	Clemson	0.071									
077-0003	Pickens	Wolf Creek	0.067*									
079-0007	Richland	Parklane	0.070*	10.1	20	0.0	15*		4.28	.8	1.3	0.01
079-0019	Richland	Bates House		10.7*	23*	0.0						0.02
079-0021	Richland	Congaree Bluff	0.061				21					
079-1001	Richland	Sandhill	0.073					39*				
083-0009	Spartanburg	North Spartanburg	0.075									
083-0011	Spartanburg	T.K. Gregg		10.7	21							
091-0006	York	York CMS	0.065				3*					
* denotes design values that did not meet completeness requirements.												

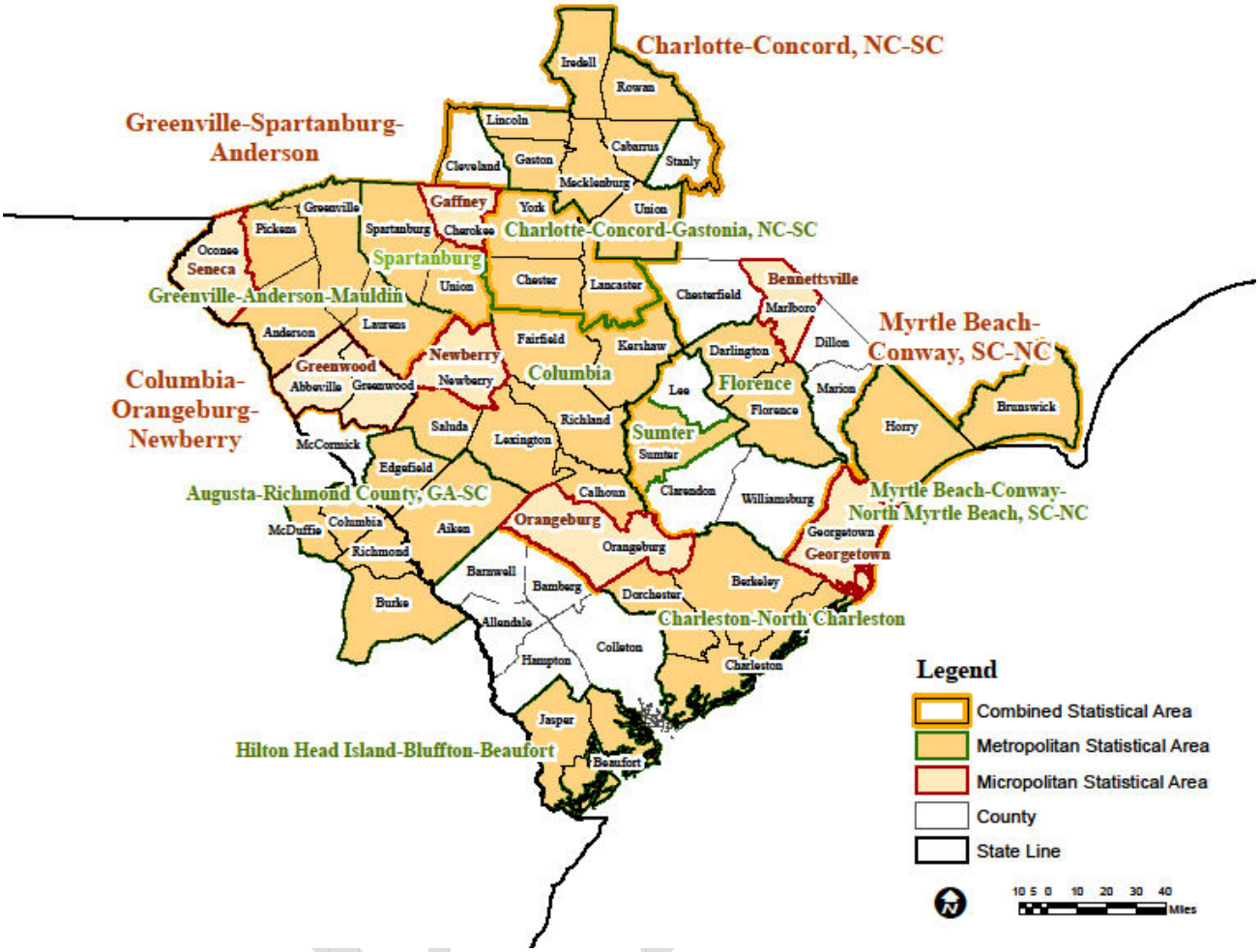
Required Monitoring

The EPA requires that each State maintain a minimum number of monitors to properly characterize air quality and to meet any required objectives of the monitoring network[5]. In general, EPA establishes minimum monitoring requirements based on the population and current ambient air monitoring design values in each Core Based Statistical Area (CBSA). The term CBSA is a collective term for the defined Metropolitan and Micropolitan Statistical Areas (MSA and μSA). A MSA area contains a core urban area of 50,000 or more population, and a μSA contains an urban core of at least 10,000 (but less than 50,000) population. Each metropolitan or micropolitan area consists of one or more counties and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core[6].

A metropolitan or micropolitan statistical area's geographic composition, or list of geographic components at a particular point in time, is referred to as its "delineation." Metropolitan and micropolitan statistical areas are delineated by the U.S. Office of Management and Budget (OMB) and are the result of the application of published standards to Census Bureau data. The standards for delineating the areas are reviewed and revised once every ten years, prior to each decennial census. Generally, the areas are delineated using the most recent set of standards following each decennial census. Between censuses, the delineations are updated annually to reflect the most recent Census Bureau population estimates. Areas based on the 2010 standards and Census Bureau data were delineated in February of 2013.[7]

The map below presents South Carolina's CBSAs based on the new definitions published in February 2013. They include a new bi-state MSA with North Carolina containing Horry County, SC and Brunswick County, NC.

[5] 40 CFR Part 58.11 paragraph (a)(3)(c) and Appendix D to 40 CFR Part 58.
[6] http://www.census.gov/population/metro/
[7] http://www.census.gov/population/metro/data/



Population

The table below presents the *2012 population estimates for each MSA in South Carolina and the total population of MSAs shared with North Carolina and Georgia.

Metropolitan Statistical Area	Population
Charlotte-Concord-Gastonia, NC-SC MSA	2,296,569
Greenville-Anderson-Mauldin, SC MSA	842,853
Columbia, SC MSA	784,745
Charleston-North Charleston, SC MSA	697,439
Augusta-Richmond County, GA-SC MSA	575,898
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	394,542
Spartanburg, SC MSA	316,997
Florence, SC MSA	206,087
Hilton Head Island-Bluffton-Beaufort, SC MSA	193,882
Sumter, SC MSA	108,052

2012 ambient air monitoring design values can be found on the table titled 2013 Criteria Pollutant Design Values on page 8. Based on the *population and design values, the minimum monitoring requirements for each MSA are presented in the table below.

MSA	Ozone	$PM_{2.5}$	$PM_{2.5}$ Cont.	PM_{10}	Lead	SO_2	NO_2	CO
**Charlotte-Concord-Gastonia, NC-SC MSA	2	2	1	2-4	0	2	2	0
Columbia, SC MSA (NCore)	2	1	1	1-2	1	1	1	1
Greenville-Anderson-Mauldin, SC MSA	2	1	1	1-2	0	1	1	0
Charleston-North Charleston, SC MSA	2	1	1	1-2	0	1	1	0
**Augusta-Richmond County, GA-SC MSA	2	2	1	1-2	0	1	1	0
Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	1	0	0	0-1	0	1	0	0
Spartanburg, SC MSA	1	0	0	0-1	0	0	0	0
Florence, SC MSA	1	0	0	0	0	0	0	0
Hilton Head Island-Bluffton-Beaufort, SC MSA	0	0	0	0	0	0	0	0
Sumter, SC MSA	0	0	0	0	0	0	0	0

*United States Census Bureau http://www.census.gov/population/metro/data/def.html and CFR 40 Part 58 Table D.

** Minimum ambient air monitoring requirements are met through cooperation with the States of Georgia and North Carolina.

Required Monitoring SO_2 – Population Weighted Emissions Index (PWEI)

On June 22, 2010, the EPA finalized revisions to the SO_2 NAAQS. As part of this rulemaking, the EPA set new minimum monitoring requirements for CBSAs based on population and SO_2 emissions. The following table presents each CBSA's population, SO_2 emissions, calculated index and minimum monitoring requirements. The process for calculating the index can be found at the bottom of the table.

CBSA	2012 CBSA Population	2010 CBSA SO_2 Emissions (Tons)	PWEI	SO_2 Minimum Monitors Required
*Charlotte-Concord-Gastonia, NC-SC MSA	2,296,569	90,125	206,978	2
Greenville-Anderson-Mauldin, SC MSA	842,853	11,496	9,690	1
Columbia, SC MSA	784,745	54,885	43,070	1
Charleston-North Charleston, SC MSA	697,439	60,859	42,446	1
*Augusta-Richmond County, GA-SC MSA	575,898	14,479	8,339	1
*Myrtle Beach-Conway-North Myrtle Beach, SC-NC MSA	394,542	17,117	6,753	1
Spartanburg, SC MSA	316,997	559	177	0
Florence, SC MSA	206,087	14,927	3,076	0
Hilton Head Island-Bluffton-Beaufort, SC MSA	193,882	309	60	0
Sumter, SC MSA	108,052	111	12	0

The PWEI is calculated using US Census population data and state emission inventory data at the CBSA level. The population for each CBSA (based on the most recent US Census or Census estimate) is multiplied by the CBSA total SO_2 emissions (reported in tons using the latest National Emissions Inventory data). This product is divided by 1,000,000 to derive the index.

- CBSA with index greater than 1,000,000 will require 3 monitors.
- CBSA with index less than 1,000,000 but greater than 100,000 will require 2 monitors.
- CBSA with index less than 100,000 but greater than 5,000 will require 1 monitor.
- CBSA with index less than 5,000 will require no monitors.

*Monitors may be operated in the non-South Carolina portion of the CBSA.

Required Monitoring for Lead Ambient Air – facilities with annual emissions greater than 0.5 tons per year (tpy)

On December 27, 2010, the EPA published revised minimum monitoring requirements for the Lead NAAQS. Any facility with annual lead emissions exceeding 0.5 tpy will be required to have a lead sampler. Based on the state-submitted 2011 National Emissions Inventory, there are no facilities in South Carolina with lead emissions greater than 0.5 tpy.

On May 7, 2010, DHEC issued an air synthetic minor construction permit to Johnson Controls Battery Group for the Florence Recycling Center (Permit No. 1040-0129-CA). Under a settlement agreement[8] with several petitioners, the Florence Recycling Center will support source-oriented ambient lead monitoring to be conducted by DHEC at several sites around the facility. Additional details of the monitoring of this facility can be found in the Florence MSA section of this plan under the site name "Johnson Controls."

[8] http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement_07142010.pdf

Near Road Monitoring

Nitrogen Dioxide

On March 7, 2013, EPA issued a final rule to revise the deadlines by which the near-road monitors within the nitrogen dioxide monitoring network are to be operational. South Carolina is part of the third phase of the deployment scheduled for 2017. Adequate funding is necessary to ensure operation of the network. To date EPA has not been able to guarantee that funding will necessarily be available for the third phase of the deployment. DHEC will review the Technical Assistance Document[9] and monitor progress of the deployment of near-road sites in other areas.

Carbon Monoxide

EPA requires the collocation of one CO monitor with a "near-road" NO_2 monitor in urban areas having populations of 1 million or more. South Carolina is not required to operate a near-road carbon monoxide monitor at this time.

$PM_{2.5}$

EPA requires the collocation of one $PM_{2.5}$ monitor with a "near-road" NO2 monitor in urban areas having populations of 1 million or more. South Carolina is not required to operate any near-road $PM_{2.5}$ samplers at this time.

Exclusion of certain $PM_{2.5}$ continuous FEM data from comparison to the NAAQS

Introduction

DHEC's monitoring program has historically operated $PM_{2.5}$ continuous monitors primarily to support reporting of the Air Quality Index (AQI). These monitors supply data every hour to update the AQI on the DHEC web site as well as on national web sites such as AIRNow (www.airnow.gov). DHEC has been using these monitors since the early part of the last decade as we implemented the $PM_{2.5}$ monitoring program. Over the last few years, a number of $PM_{2.5}$ continuous monitors have been approved as Federal Equivalent Methods (FEMs). By utilizing an approved FEM, any subsequent data produced from the method may be eligible for comparison to EPA's health based standard known as the NAAQS. The primary advantage of operating a $PM_{2.5}$ continuous FEM is that it can support both the AQI, while also supplying data that are eligible for comparison to the NAAQS. Thus, a network utilizing $PM_{2.5}$ continuous FEM can minimize the number of filter-based FRMs operated in the network, which are primarily used for comparison to the NAAQS. These filter-based FRMs are resource intensive in that they require field operators as well as pre- and post-sampling laboratory analysis which results in data not being available for approximately 2-4 weeks after sample collection.

DHEC's monitoring program has been working with $PM_{2.5}$ continuous FEMs including deployment at a few sites to evaluate their performance. Although the $PM_{2.5}$ continuous FEMs are automated methods, these methods still require careful attention in their set-up, operation, and validation of data. Once DHEC was able to collect enough data, the agency began to evaluate the performance of these methods compared to collocated FRMs. That evaluation is explained further below and includes DHEC's recommendations on the use of the data from these methods.

Request for exclusion of $PM_{2.5}$ continuous FEM data from comparison to the NAAQS

In accordance with the PM NAAQS rule published on January 15, 2013 (78 FR 3086) and specific to the provisions detailed in §58.11 (e) DHEC is requesting that data from the following monitors be set aside for comparison to the NAAQS. DHEC is working to optimize the monitoring instrumentation we use to meet all of our monitoring objectives.

[9] http://www.epa.gov/ttn/amtic/nearroad.html

However, at this time, DHEC does not believe the comparability of the $PM_{2.5}$ continuous FEMs operated in our network as compared to collocated FRMs is sufficient to meet data quality objectives.

After addressing the comparability of the $PM_{2.5}$ FEMs to the FRMs for our network, DHEC has determined that the sites listed below do not meet the comparability requirements. Detailed one-page assessments from which the information described below was obtained are included at the end of this section.

Table – Request for Exclusion of $PM_{2.5}$ Continuous FEM Data

Site Name	City	Site ID	Cont POC	Method Description	$PM_{2.5}$ FEM. Begin Date	$PM_{2.5}$ FEM End Date	Continuous/FRM Sampler pairs per season		Slope (m)	Intercept (y)	Meets bias requirement	Correlation (r)
Sites with $PM_{2.5}$ continuous FEMs that are collocated with FRMs:												
Greenville ESC	Greenville	45-045-0015	3	Thermo 1405 8500C FDMS w/VSCC-FDMS Gravimetric	1/1/2011	NA	Winter =	71	1.16	-2.23	No	0.87
							Spring =	77				
							Summer =	90				
							Fall =	31				
							Total =	269				
Long Creek	None	45-077-0001	3	Thermo 1405 8500C FDMS w/VSCC-FDMS Gravimetric	1/5/2011	NA						

Period of exclusion of data from the $PM_{2.5}$ Continuous FEMs

The above table details the period of available data by monitor for which we are basing our recommendation to exclude $PM_{2.5}$ continuous data. Per EPA Regional Office approval, we will load or move as necessary these data to EPA's AQS database in a manner where the data are only used for the appropriate monitoring objective(s) (i.e., use data for both the NAAQS and AQI, just the AQI, or neither the NAAQS or AQI). Additionally, we will continue to load any new data generated for the next 18 months (intended to represent the period until December 31, 2014) in the same manner or until such time as we request and receive approval from the EPA Regional Office to change the monitoring objectives that the data from the $PM_{2.5}$ continuous FEMs can support.

$PM_{2.5}$ continuous FEM data for reporting the AQI

While we are requesting the monitors above not be used for comparison to the NAAQS, we do believe that the data are of sufficient comparability to collocated FRMs that they be used in AQI reporting. Therefore, with EPA Regional Office approval we will report these data on our web site and to AirNow (www.airnow.gov). Additionally, we intend to store the data in EPA's AQS database that is used for "acceptable AQI" reporting (i.e., parameter code 88502) so that data users will know that these data are appropriate for use in AQI calculations.

Continued operation of $PM_{2.5}$ monitors to support NAAQS and AQI reporting

While we are requesting that data from the monitors listed above be set aside for comparison to the NAAQS, we will continue to operate $PM_{2.5}$ FRMs to support the objective of comparison to the NAAQS. We will also operate our $PM_{2.5}$ continuous monitors for use in AQI reporting. Each of these FRM and $PM_{2.5}$ continuous monitors will be operated at the locations previously described in this plan and at the locations that meet the objectives of the Network Design Criteria for Ambient Air Quality Monitoring described in Appendix D to Part 58.

Assessments

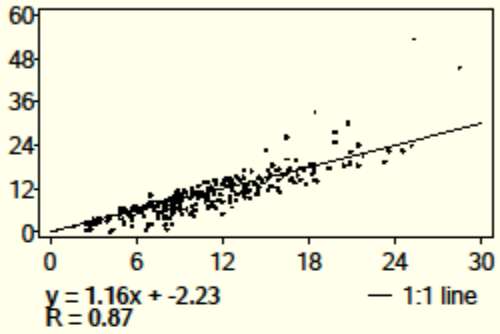
The following one-page assessment is a location where our agency has collocated $PM_{2.5}$ FRM and continuous FEM monitors. This assessment is represented in the "Table – Request for Exclusion of $PM_{2.5}$ Continuous FEM Data" above.

PM 2.5 Continuous Monitor Comparability Assessment

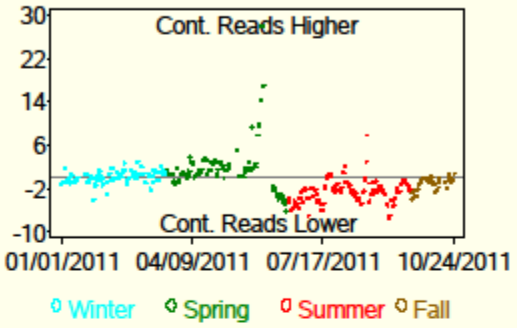
Site 45-045-0015: Greenville, SC

FRM: R & P Model 2025 PM2.5 Sequential w/WINS-GRAVIMETRIC (118), PM2.5 - Local Conditions (88101), POC=1
Cont: Thermo Scientific TEOM 1400 FDMS or 1405 8500C FDMS w/VSCC-FDMS Gravimetric (181), PM2.5 - Local Conditions (88101), POC=3

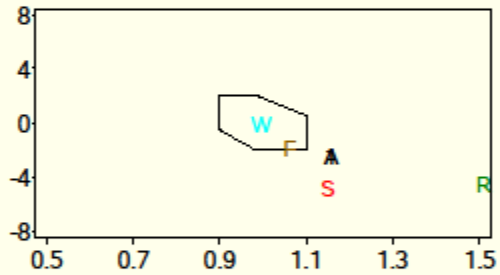
Cont. (y) vs. FRM (x) PM 2.5 (µg/m³)



Cont. minus FRM PM 2.5 (µg/m³)

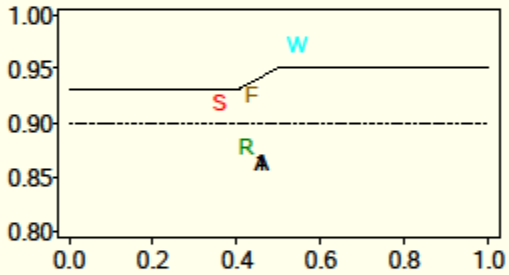


Additive (y) vs. Multiplicate (x) Bias



A=AllData, 9=2009, 0=2010, 1=2011
W=Winter, R=Spring, S=Summer, F=Fall

R (y) vs. FRM CCV (x)



A=AllData, 9=2009, 0=2010, 1=2011
W=Winter, R=Spring, S=Summer, F=Fall

Mean PM 2.5 (µg/m³)

Dataset	N	FRM	Cont	Ratio (Cont/FRM)
AllData	269	10.9	10.4	0.95
Winter	71	9.8	9.9	1.01
Spring	77	11.6	13.3	1.15
Summer	90	12.5	9.8	0.79
Fall	31	7.2	6.0	0.84
2009	0	.	.	.
2010	0	.	.	.
2011	269	10.9	10.4	0.95

Appendix A Statistics

Dataset	N (all observations)	Bias	N (only >= 3 ug/m^3)	Bias
AllData	269	-8.2	245	-3.2
Winter	71	0.4	67	1.4
Spring	77	11.1	75	12.4
Summer	90	-27	78	-20
Fall	31	-20	25	-11
2009	0	.	.	.
2010	0	.	.	.
2011	269	-8.2	245	-3.2

Data Source: EPA AQS Data Mart

Generated on: April 22, 2013

Interpreting the results

In most cases determining whether the combination of the multiplicative (slope) and additive (intercept) bias is inside or outside the required test specification can be done simply by inspecting the Additive (y) vs. Multiplicative (x) Bias figure on the middle left side of the one-page assessment above. Use the "A" from the chart as it represents all of the data. In this case A is clearly outside the box, which indicates that this bias does not meet the acceptance criteria.

However, in some cases an agency may want to ensure that the combination of the multiplicative (slope) and additive (intercept) bias is outside the required test specifications. To do that the following questions below are answered solving for the allowable intercept.

From 40 CFR Part 53, Table C-4

Does the slope of regression relationship meet the test specification of 1 ± 0.10?

No, the slope of the regression is 1.16, which is outside of 1 ± 0.10

Does the intercept ($\mu g/m^3$) of the regression relationship meet the test specification of between: 15.05 - (17.32 * slope), but not less than -2.0; and 15.05 - (13.20 * slope), but not more than +2.0?

15.05 - (17.32 * 1.16) = -5.04, which is more negative than -2.0. Therefore use -2.0 as the most negative the intercept can be with a slope of 1.16.

15.05 – (13.20 * 1.16) = -0.26, which is within the maximum +2.0. Therefore use -0.26 as the most positive the intercept can be with a slope of 1.16.

No, the intercept of -2.23 is outside the bounds of -2.0 to -0.26 that is allowed for a slope of 1.16 and therefore confirms that the overall bias has not been met.

Summary of 2014 Network Changes

Augusta-Richmond County MSA (South Carolina portion includes Aiken and Edgefield Counties)

No changes planned for 2014.

Charleston-North Charleston MSA

No changes planned for 2014.

Charlotte-Concord-Gastonia MSA

No changes planned for 2014.

Columbia MSA

No changes planned for 2014.

Florence MSA

No changes planned for 2014.

Greenville-Anderson-Mauldin MSA

Greenville ESC (45-045-0015) Carbon Monoxide monitoring was terminated in July 2012.

Clemson CMS (45-077-0002) will be terminated.

Spartanburg MSA

No changes planned for 2014.

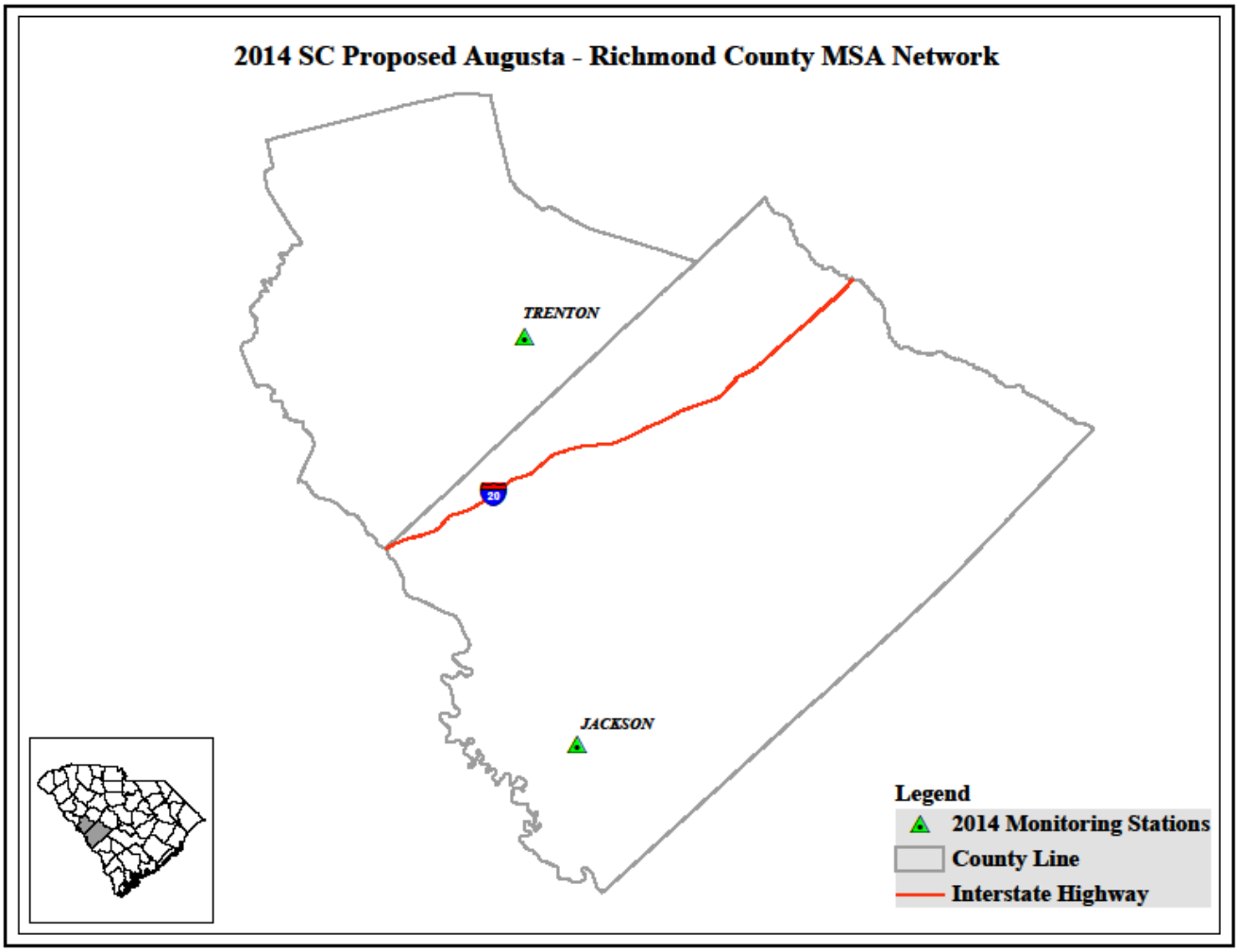
Remainder of State

Ashton (45-029-0002) $PM_{2.5}$ monitor designation was changed from SPM to SLAMS to reflect its use as a required regional background site.

Long Creek (45-073-0001) $PM_{2.5}$ monitor designation was changed from SLAMS to SPM to due to inadequate performance of the FEM (which was replacing an FRM) at that location.

Site Descriptions

Augusta-Richmond County, GA-SC MSA (part)



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead / TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-003-0003	Jackson Middle School						●												
45-037-0001	Trenton	○	○				●												
	TOTAL	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

○ SPM / Other
● SLAMS
●●/○○ indicates duplicate / QA monitors

Jackson Middle School
CSA/MSA: none/Augusta-Richmond County MSA
AQS Site ID: 45-003-0003
Location: 8217 Atomic Road
County: Aiken
Coordinates: +33.342226, -81.788731
Date Established: October 24, 1985
Site Evaluation: The most recent site evaluation was conducted on June 14, 2006 (QA Check: March 29, 2012).

The Jackson Middle School site is located in southwestern Aiken County at the Jackson Middle School. The Jackson site only monitors for ozone. Jackson is located in a suburban setting to monitor concentrations upwind of the Augusta urbanized area. The sample inlet is 138.8 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind Background	SLAMS	3.38	FEM Ultraviolet Photometry	Continuous

Trenton
CSA/MSA: none/Augusta-Richmond County MSA
AQS Site ID: 45-037-0001
Location: 660 Woodyard Road (Hwy 121)
County: Edgefield
Coordinates: +33.739963, -81.853635
Date Established: March 28, 1980
Site Evaluation: The most recent site evaluation was conducted on March 18, 2003 (QA Check: March 29, 2012).

The Trenton site is located in southeastern Edgefield County. Trenton was originally established to monitor for ozone crossing into South Carolina from Georgia. The Trenton site has both FRM and continuous monitoring for $PM_{2.5}$. The sample inlets are 39.4 meters from the nearest road.

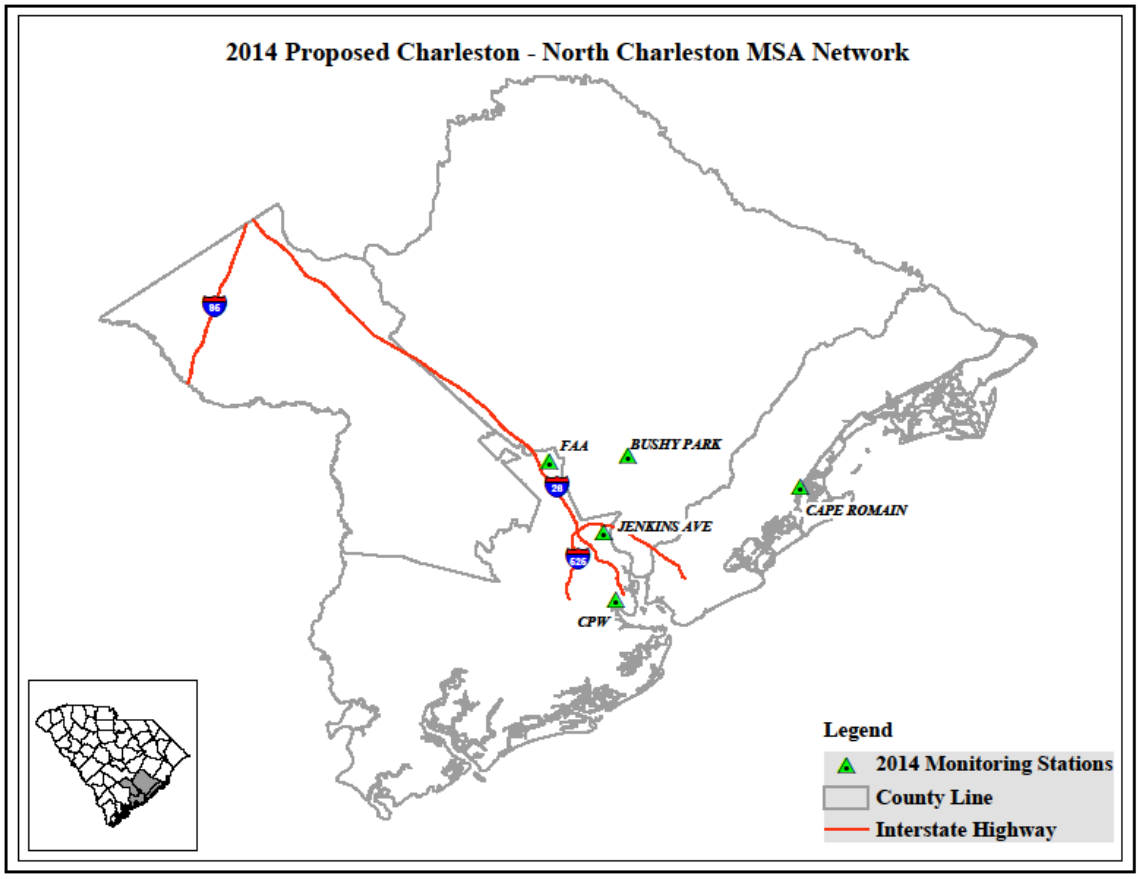
Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Urban	Extreme Downwind	SPM	4.5	Gravimetric	1:3
Continuous $PM_{2.5}$	Urban	Extreme Downwind	SPM non-regulatory	4.5	TEOM 50°C	Continuous
Ozone	Urban	Maximum Ozone Concentration / Extreme Downwind	SLAMS	3.5	FEM Ultraviolet Photometry	Continuous

Charleston-North Charleston MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead / TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-015-0002	Bushy Park Pump Station						●												
45-019-0003	Jenkins Ave. Fire Station				●			O	O										
45-019-0046	Cape Romain		O	O			●	O	O		O	O							O
45-019-0048	FAA	OO																	
45-019-0049	CPW	●																	
	TOTAL	3	1	1	1	0	2	2	2	0	1	1	0	0	0	0	0	0	1

O SPM / Other
● SLAMS
●●/OO indicates duplicate / QA monitors

Bushy Park Pump Station
CSA/MSA: none/Charleston-North Charleston MSA
AQS Site ID: 45-015-0002
Location: River Oak Drive (Goose Creek)
County: Berkeley
Coordinates: +32.987252, -79.936700
Date Established: June 20, 1978
Site Evaluation: The most recent site evaluation was conducted on March 17, 2003 (QA Check: May 19, 2011).

The Bushy Park Pump Station site is located in southeastern Berkeley County downwind from the Charleston urban area. The monitoring objective is maximum ozone concentration. The sample inlets are 11.3 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	3.0	FEM Ultraviolet Photometry	Continuous

Jenkins Ave. Fire Station
CSA/MSA: none/Charleston-North Charleston MSA
AQS Site ID: 45-019-0003
Location: 4830 Jenkins Ave.
County: Charleston
Coordinates: +32.882289, -79.977538
Date Established: February 14, 1969
Site Evaluation: The most recent site evaluation was conducted on March 2, 2005 (QA Check: June 2, 2011).

The Jenkins Ave. Fire Station site is located in the city of North Charleston. The site is located in an urban and central city setting. The Jenkins Ave. Fire Station site supports monitors for PM_{10}, sulfur dioxide and nitrogen dioxide. The sample inlets are 9.6 meters from the nearest road.

Changes for 2014:

No changes planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM_{10}	Neighbor-hood	Highest Concentration	SLAMS	4.3	FEM TEOM	Continuous
Sulfur Dioxide	Neighbor-hood	Population Exposure	SPM	4.3	FEM UV Fluorescence	Continuous
Nitrogen Dioxide	Neighbor-hood	Highest Concentration Source Oriented	SPM	4.3	FRM Chemilumine scence	Continuous

Cape Romain

CSA/MSA: none/Charleston-North Charleston MSA
AQS Site ID: 45-019-0046
Location: 390 Bulls Island Road (Awendaw)
County: Charleston
Coordinates: +32.941023, -79.657187
Date Established: July 11, 1983
Site Evaluation: The most recent site evaluation was conducted on June 3, 2005 (QA Check: April 21, 2011).

The Cape Romain site is located in Charleston County at the Cape Romain National Wildlife Refuge (NWR) near Moore's Landing.

The Cape Romain NWR is a Class I area about 20 miles northeast of Charleston. The majority of the Refuge area is offshore extending from Bull Island 20 miles northeast to Cape Romain. The Refuge is bordered on the west by the Intracoastal Waterway. Inland are large tracts of forests with scattered residences. Several miles inland, a primary coastal route, US Highway 17, parallels the coast, with some development along the section of highway that is closest to the Refuge.

The Cape Romain site has samplers for $PM_{2.5}$ speciation and continuous monitors for sulfur dioxide, nitrogen dioxide, ozone, black carbon, meteorological parameters and $PM_{2.5}$. The sample inlets are 18 meters from the nearest road.

The Cape Roman site is collocated with the Interagency Monitoring of Protected Visual Environments (IMPROVE) sampling site and nearby monitoring performed by other agencies includes precipitation chemistry and mercury deposition. The site has been used for multiple interagency and regional air monitoring projects.

Changes for 2014:

No changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Urban	General Background	SPM non-regulatory	3.0	TEOM 30°C	Continuous
Speciated $PM_{2.5}$	Urban	Visibility	IMPROVE	3.0	IMPROVE protocol	1:3
Ozone	Regional	General	SLAMS	4.0	FEM Ultraviolet	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
		Background			Photometry	
Sulfur Dioxide	Regional	Source Oriented	SPM	4.0	FEM UV Fluorescence	Continuous
Nitrogen Dioxide	Regional	General Background	SPM	4.0	FRM Chemiluminescence	Continuous
Sulfate	Regional	General Background	non-regulatory	4.0	Catalytic thermal reduction / Pulsed fluorescence	Continuous
Black Carbon	Regional	General Background	non-regulatory	4.0	Optical absorption	Continuous
Wind Speed / Direction	Neighbor-hood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and direction and precipitation	Continuous

FAA
CSA/MSA: none/Charleston-North Charleston MSA
AQS Site ID: 45-019-0048
Location: 2670 Elms Plantation Blvd
County: Charleston
Coordinates: +32.980254, -80.065010
Date Established: April 9, 1999
Site Evaluation: The most recent site evaluation was conducted on May 4, 2006 (QA Check: May 19, 2011).

The Charleston FAA Beacon site is located in Charleston County approximately five miles northwest of the Charleston International Airport near Charleston Southern University. This site has collocated $PM_{2.5}$ samplers. The sample inlets are 50 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure	SPM	2.3	FRM Gravimetric	1:1
Collocated $PM_{2.5}$	Neighbor-hood	Population Exposure	QA Collocated	2.3	FRM Gravimetric	1:6

Charleston Public Works
CSA/MSA: none/Charleston-North Charleston MSA
AQS Site ID: 45-019-0049
Location: 360 Fishburne Street
County: Charleston
Coordinates: +32.790984, -79.958694
Date Established: November 20, 1998
Site Evaluation: The most recent site evaluation was conducted on April 24, 2006. (QA Check: June 11, 2011).

The Charleston Public Works (CPW) site is located on the western side of the Charleston peninsula near downtown Charleston. The CPW site supports the required $PM_{2.5}$ monitor for the MSA. The sample inlets are 28 meters from the nearest road.

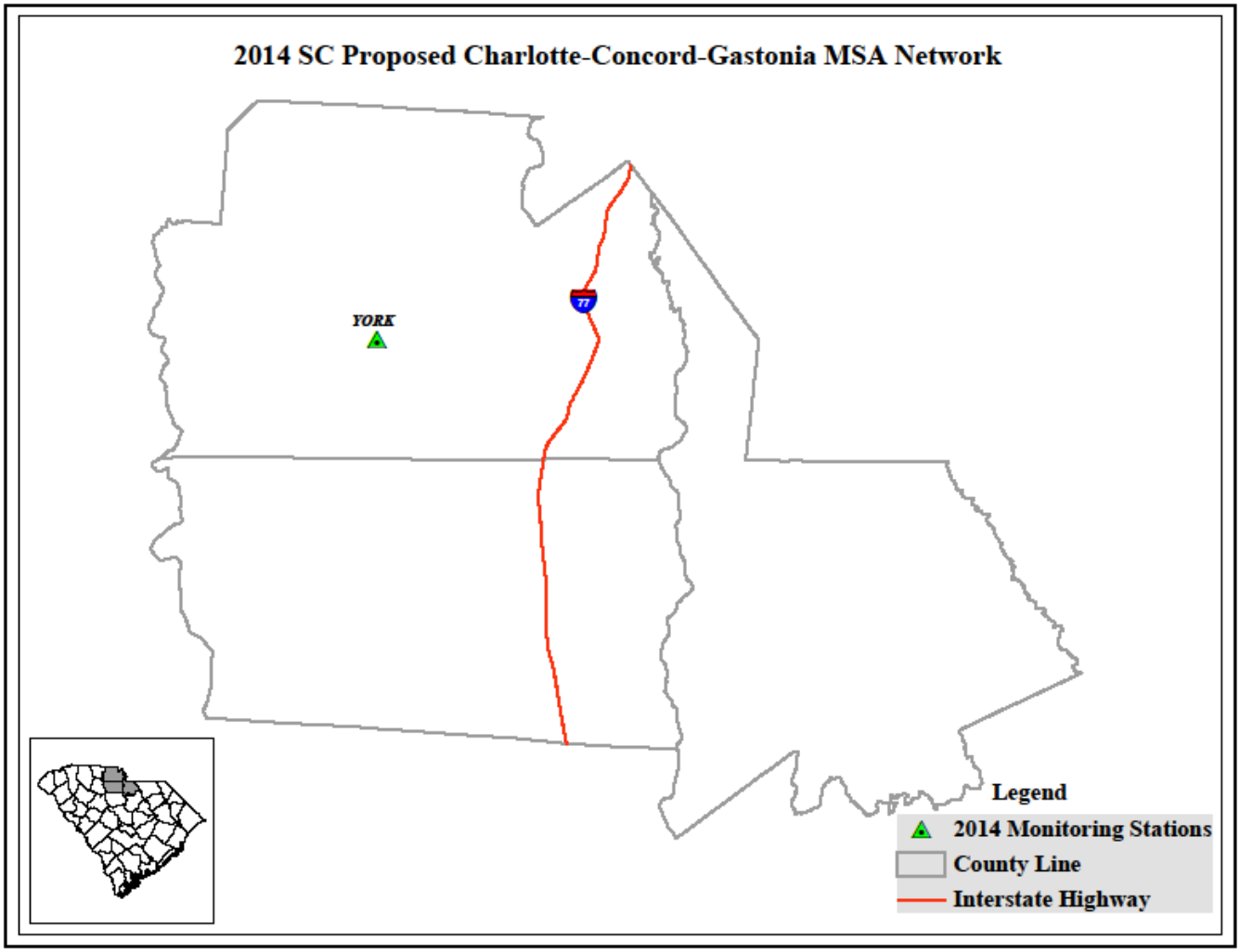
Changes for 2014:

DHEC will continue to collaborate with local stakeholders to establish a site in the Charleston Neck/North Charleston area which accurately represents current and changing impacts to particulate concentrations. Once the new monitoring location has been established, DHEC will collect at least one year of concurrent monitoring data from both sites. The data will be evaluated and the most appropriate location chosen to meet area $PM_{2.5}$ monitoring objectives.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure	SLAMS	2.4	Gravimetric	1:1

Charlotte-Concord-Gastonia MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead / TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-091-0006	York CMS						●	●											○
	TOTAL	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1

○ SPM / Other
● SLAMS
●●/○○ indicates duplicate / QA monitors

York CMS
CSA/MSA: Charlotte-Concord CSA / Charlotte-Concord-Gastonia MSA
AQS Site ID: 45-091-0006
Location: 2316 Chester Highway (US 321)
County: York
Coordinates: +34.935817, -81.228409
Date Established: March 30, 1993
Site Evaluation: The most recent site evaluation was conducted on June 13, 2006 (QA Check: May 02, 2008).

The York CMS site is located in south-central York County. The site was established to represent background levels near the Charlotte urban area. York CMS has monitors for ozone and sulfur dioxide, as well as a wind tower. This monitor is located in a rural setting with sample inlets 171.4 meters from the nearest road.

In 2011, sulfur dioxide monitoring was added to meet minimum monitoring requirements for the Charlotte-Concord-Gastonia MSA in accordance with the North Carolina Monitoring Memorandum of Agreement.

The long historical record and location of the site make the data useful to both North and South Carolina Air Programs.

Access to the property occupied by this site may be lost within the next few years. DHEC will begin looking into alternative locations for ozone monitoring within York County.

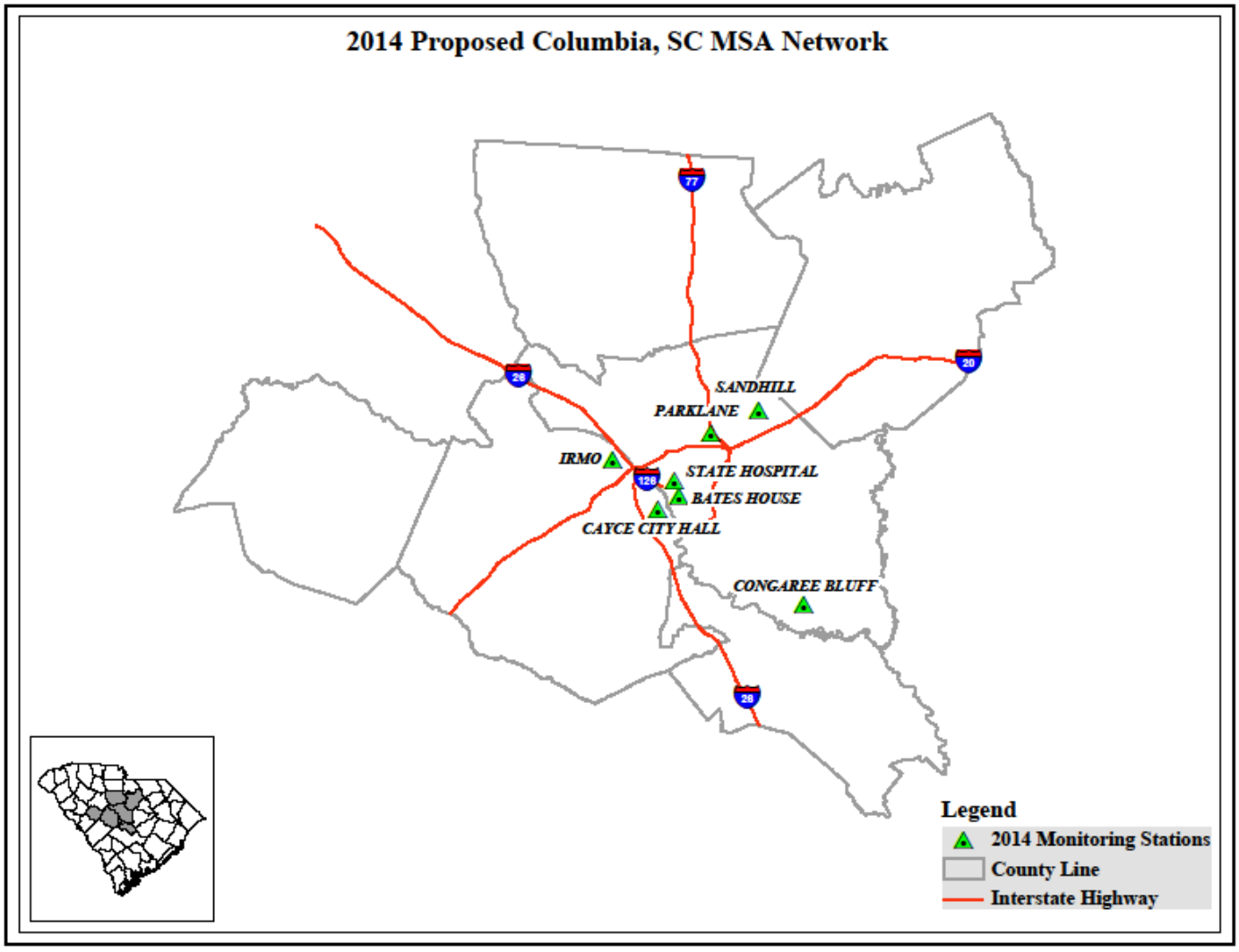
Changes for 2014:

SO_2 designation will be changed to SPM to reflect that this is not a required monitor.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind Background	SLAMS	3.3	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Urban	Upwind Background	SLAMS	3.3	FEM UV fluorescence	Continuous
Wind Speed / Direction	Neighbor-hood	Local Conditions	non-regulatory	10.0	Instruments for wind speed, wind direction.	Continuous

Columbia MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead /TSP	O_3	SO_2	$NO_2/NO/NO_y$	CO	Sulfate	BC	Carbonyls	SVOC	VOC	Mercury	Precip Chem.	Precip.	MET
45-063-0008	Irmo	●	O					O				O	O	O					
45-063-0010	Cayce City Hall				●														
45-079-0007	Parklane (NCore)	●	O	●	O	●	●	●	●*	●				O			O	O	●**
45-079-0019	Bates House (USC)	●●			●														
45-079-0020	State Hospital												O	O					
45-079-0021	Congaree Bluff						O	O								OO	O	O	O
45-079-1001	Sandhill						●		O										O
	TOTAL	4	2	1	3	1	3	3	3	1	0	1	2	3	0	2	2	2	4

O SPM / Other

●●/OO indicates duplicate / QA samplers

● SLAMS/NCore *NO and NO_y will be monitored

**see details on page for number of parameters

Irmo
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-063-0008
Location: 200 Leisure Lane
County: Lexington
Coordinates: +34.051017, -81.154950
Date Established: April 7, 1989
Site Evaluation: The most recent site evaluation was conducted on February 25, 2005 (QA Check: March 06, 2012).

The Irmo site is located in Lexington County near the Town of Irmo. This site has a sampler for $PM_{2.5}$ and continuous monitors for sulfur dioxide, black carbon and $PM_{2.5}$. Additionally, this site has samplers collecting carbonyl and SVOC samples on a 1:6 schedule. The sample inlets are 43.4 meters from the nearest road. The Irmo site supports the required collocated $PM_{2.5}$ continuous monitor for the MSA.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure	SLAMS	5.0	FRM Gravimetric	1:1
$PM_{2.5}$	Neighbor-hood	Population Exposure	SPM non-regulatory	4.6	TEOM 30°C	Continuous
Sulfur Dioxide	Neighbor-hood	Source-Oriented	SPM	3.4	FEM UV fluorescence	Continuous
Black Carbon	Urban	Population Exposure / General Background	non-regulatory	4.0	Optical absorption	Continuous
Carbonyls	Neighbor-hood	Population Exposure	non-regulatory	3.9	HPLC Ultraviolet Absorption	1:6
SVOC	Neighbor-hood	Population Exposure	non-regulatory	3.9	PUF/GCMS	1:6

Cayce City Hall
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-063-0010
Location: 1830 Morlaine Rd.
County: Lexington
Coordinates: 33.969145, -81.066290
Date Established: December 6, 2007
Site Evaluation: PENDING (QA Check: March 06, 2012).

Cayce City Hall was established to measure PM_{10} concentrations in populated areas and to determine the potential impact of occasional high concentrations on neighborhoods surrounding the industrialized area.

The sample inlet is 32.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM_{10}	Neighbor-hood	Population Exposure	SLAMS	2.4	TEOM	Continuous

Parklane (NCore)
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-079-0007
Location: 8311 Parklane Road
County: Richland
Coordinates: +34.093959, -80.962304
Date Established: April 3, 1980
Site Evaluation: The most recent site evaluation was conducted on March 22, 2007 (QA Check: March 01, 2012).

The Parklane site is located in north central Richland County. This site supports the required suite of samplers and monitors for NCore, which includes a FRM $PM_{2.5}$ sampler, and a continuous $PM_{2.5}$ monitor. Other requirements for NCore are a lead sampler and continuous monitors for ozone, sulfur dioxide, carbon dioxide, nitric oxide, nitrogen oxides. A continuous $PM_{2.5}$ monitor and samplers for precipitation chemistry, precipitation and semi-volatile organic compounds are also located in this site. The sample inlets are 57.0 meters from the nearest road.

The site was originally placed to provide downwind population exposure measurements at the edge of the Columbia urban area population and has been expanded to support the full complement of NCore parameters. The site also provides support for demonstration, training and equipment evaluation convenient to DHEC's Columbia air laboratory.

Changes for 2014:

No changes are planned for 2014.

Monitors:

*Bolded parameters are a NCore requirement.

(Table continues on next page)

Parameter ***Required**	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure	NCore	5	FRM Gravimetric	1:3
$PM_{2.5}$	Neighbor-hood	Population Exposure	SPM non-regulatory	4.4	TEOM	Continuous
Speciated $PM_{2.5}$	Neighbor-hood	Population Exposure	NCore	3	Energy dispersive XRF, Ion chromatography, CSN TOT	1:3

Parameter ***Required**	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM_{10}	Neighbor-hood	Population Exposure	NCore	4.4	TEOM	Continuous
$PM_{10-2.5}$	Neighbor hood	Population Exposure	NCore	5	Gravimetric FRM Pair	1:3
Lead	Neighbor-hood	Population Exposure	NCore	2.5	GFAA	1:6
Ozone	Urban	Max Ozone Concentration	NCore	4.1	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Neighbor-hood	Population Exposure	NCore	4.4	UV Florescence	Continuous
Nitric Oxide	Neighbor-hood	Population Exposure	NCore	10	Chemi-luminesence	Continuous
NO_y	Neighbor-hood	Population Exposure	NCore	10	Chemi-luminesence	Continuous
Carbon Monoxide	Urban	Population Exposure	NCore	4.1	Non-dispersive Infrared	Continuous
SVOC	Neighbor-hood	Population Exposure	SPM	2.5	PUF-GC/MS	1:6
Precipitation chemistry	Neighbor-hood	Local Conditions	Not applicable	1.4	Not applicable	Weekly sample
Precipitation	Neighbor-hood	Local Conditions	Not applicable	1.1	Not applicable	Continuous
Wind Speed / Direction	Neighbor-hood	Local Conditions	Not applicable	10	Not applicable	Continuous

Bates House (USC)
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-079-0019
Location: 323 S. Bull Street
County: Richland
Coordinates: +33.991509, -81.024141
Date Established: November 24, 1998
Site Evaluation: The most recent site evaluation was conducted on March 17, 2003 (QA Check: March 01, 2012).

The Bates House (USC) site is located in Richland County on the University of South Carolina (USC)-Columbia campus. The Bates House site has a sampler for $PM_{2.5}$. Additionally, this site has collocated precision sampling for $PM_{2.5}$. The sample inlets are 28.8 meters from the nearest road.

The site has collocated wind measurement equipment (3m) operated by the USC Geography Department.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure	SLAMS	2.41	FRM Gravimetric	1:1
Collocated $PM_{2.5}$	Neighbor-hood	Quality Assurance	QA Collocated	2.41	Gravimetric	1:6
PM_{10}	Neighbor-hood	Population Exposure	SLAMS	2.24	TEOM	Continuous

State Hospital
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-079-0020
Location: 2100 Bull Street
County: Richland
Coordinates: +34.015494, -81.034179
Date Established: January 7, 1999
Site Evaluation: The most recent site evaluation was conducted on February 9, 2006 (QA Check: March 20, 2012).

The State Hospital site is located in Columbia near the intersection of Elmwood Avenue and Bull Street on the grounds of the South Carolina State Hospital. State Hospital has samplers for carbonyls and semi-volatile organic compounds. The sample inlets are 10.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014. Access to this site may be lost due to recent sale and planned use of the property.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Carbonyls	Middle Scale	Highest Concentration	non-regulatory	4.23	HPLC Ultraviolet Absorption	1:6
SVOC	Neighbor-hood	General / Background	non-regulatory	2.87	PUF-GC/MS	1:6

Congaree Bluff

CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-079-0021
Location: 1850 South Cedar Creek Road
County: Richland
Coordinates: +33.814680, -80.781135
Date Established: December 27, 1999
Site Evaluation: The most recent site evaluation was conducted on April 11, 2005 (QA Check: March 20, 2012).

The Congaree Bluff site is located in southern Richland County. The site is located in a rural setting within the boundaries of the Congaree National Park. The Congaree Bluff site has monitors for ozone, sulfur dioxide, mercury vapor and precipitation. Congaree Bluff also has samplers for mercury deposition and precipitation chemistry. The sample inlets are 191.7 meters from the nearest road.

The Congaree Bluff monitoring continues a data record begun in 1981 with the establishment of the Congaree Swamp site (45-079-1006). The original site was established in cooperation with the Department of the Interior and the support of the General Assembly to provide long term monitoring in this unique area. The Congaree Swamp site was located in the flood plain and had to be relocated to the current Congaree Bluff site in 2001.

The National Park Service collects wind data on a collocated 30 meter wind tower.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SPM	4.23	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Urban	General / Background	SPM	4.23	FEM UV Fluorescence	Continuous
Mercury (vapor)	Urban	Source Oriented	non-regulatory	4.23	Cold Vapor Atomic Fluorescence	Continuous
Mercury Deposition	Urban	Source Oriented	NADP-MDN	1.71	MDN protocol	Weekly samples
Precipitation	Regional	Regional	non-	1.73	IC	1 Week

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
chemistry		Transport	regulatory			Tue-Tue
Precipitation	Neighbor-hood	Local Conditions	non-regulatory	1.5	Tipping Bucket	Continuous

Sandhill Experimental Station
CSA/MSA: Columbia-Orangeburg-Newberry CSA / Columbia MSA
AQS Site ID: 45-079-1001
Location: 900 Clemson Road
County: Richland
Coordinates: +34.131262, -80.868318
Date Established: January 1, 1959
Site Evaluation: The most recent site evaluation was conducted on July 1, 2002 (QA Check: March 01, 2012).

The Sandhill Experimental Station site is located in northeastern Richland County, downwind from the Columbia metropolitan area. This site is located in a rapidly urbanizing portion of the city of Columbia. The Sandhill site measures nitrogen dioxide, ozone, wind direction and wind speed.

The sample inlets are 33.5 meters from the nearest road.

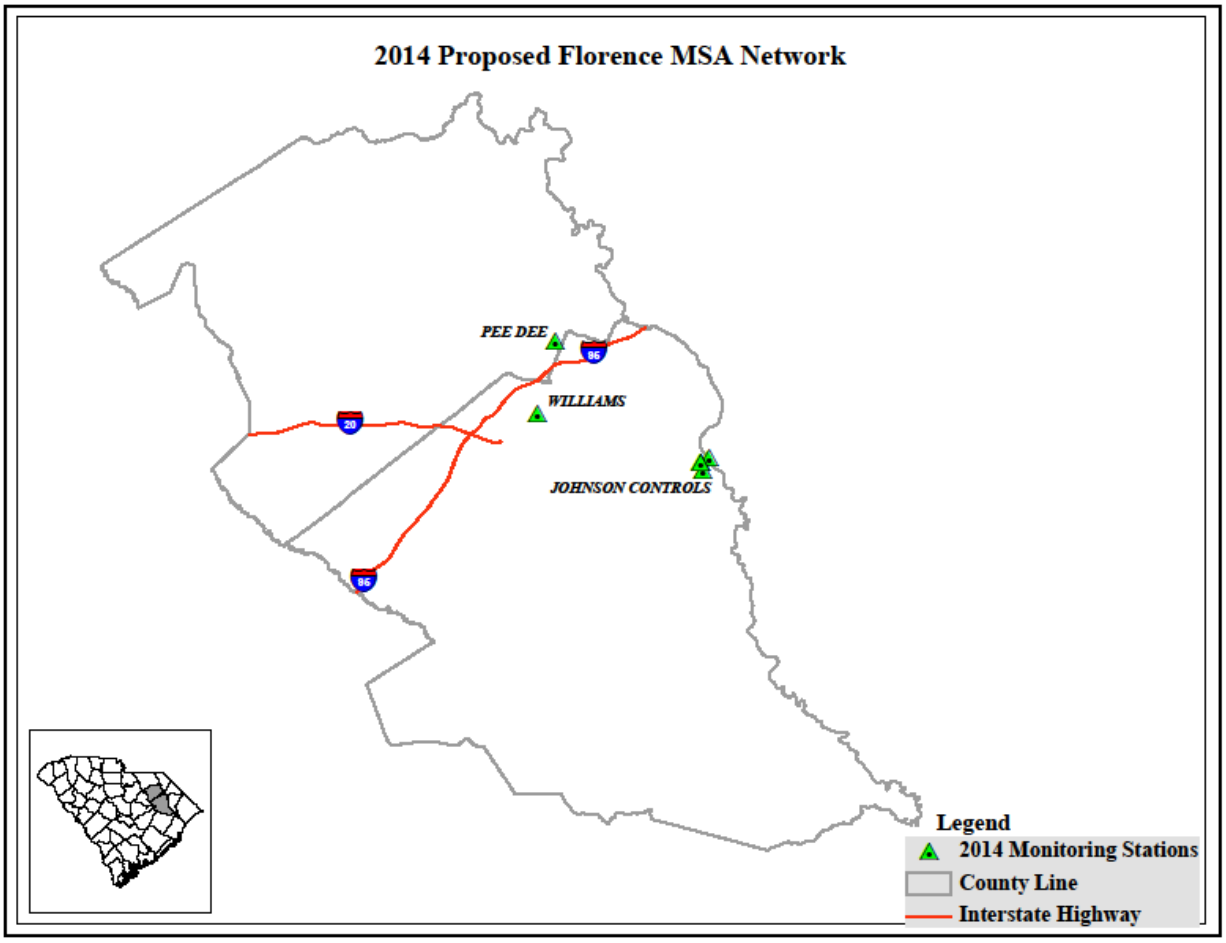
Changes for 2014:

There are no changes planned in 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	4.3	FEM Ultraviolet Photometry	Continuous
Nitrogen Dioxide	Urban	General / Background Max Precursor Emissions Impact	SPM	4.3	FRM Chemiluminescence	Continuous
Wind Speed / Direction	Neighbor-hood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and wind direction	Continuous

Florence MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead / TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-031-0003	Pee Dee Exp. Station						●												
45-041-0003	Williams Middle School	●	○																
45-041-8001, 8002, 8003	Johnson Controls					●*													
	TOTAL	1	1	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0

○ SPM / Other
● SLAMS
●●/○○ indicates duplicate / QA monitors
* See details on page for number of samplers

Pee Dee Experimental Station
CSA/MSA: none/Florence MSA
AQS Site ID: 45-031-0003
Location: 2200 Pocket Road (Darlington)
County: Darlington
Coordinates: +34.285696, -79.744859
Date Established: February 25, 1993
Site Evaluation: The most recent site evaluation was conducted on March 14, 2006 (QA Check: May 5, 2011).

The Pee Dee Experimental Station site is located in northeastern Darlington County. This site serves as the required ozone monitor in the Florence MSA. The sample inlets are 91 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration/ General Background	SLAMS	4.2	FEM Ultraviolet Photometry	Continuous

Williams Middle School
CSA/MSA: none/Florence MSA
AQS Site ID: 45-041-0003
Location: 1119 N. Irby Street
County: Florence
Coordinates: 34.214263, -79.767347
Date Established: August 4, 2008
Site Evaluation: PENDING (QA Check: May 5, 2011).

DHEC established the Williams site to meet the 40 CFR Part 58 Appendix D requirements for objective and collocated continuous monitoring and reporting.

The Florence MSA requires one $PM_{2.5}$ sampler. A collocated continuous monitor is also required to provide timely reporting of concentrations to the public. The sample inlets are 56.4 meters from the nearest road.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure Highest Concentration	SLAMS	2.7	FRM Gravimetric	1:3
$PM_{2.5}$	Neighbor-hood	Population Exposure Highest Concentration	SPM non-regulatory	3.1	TEOM	Continuous

Johnson Controls (3 Sites-JCI Railroad, JCI Entrance, JCI Woods)
)
CSA/MSA: none/Florence MSA
AQS Site ID: 45-041-8001, 8002, 8003
Location: Liberty Chapel @ Bethel Rd., Liberty Chapel @ Paper Mill Rd., Liberty Chapel @ Paper Mill Rd.
County: Florence
Coordinates: +34.1555670, -79.569830; +34.164160, -79.572330; +34.167500, -79.562660
Site Evaluation: PENDING

On May 7, 2010, DHEC issued an air synthetic minor construction permit to Johnson Controls Battery Group for the Florence Recycling Center (Permit No. 1040-0129-CA). Under a settlement agreement[7] with several petitioners, the Florence Recycling Center will conduct source-oriented ambient lead monitoring at three locations around the facility.

Initial sampling will be conducted on a 1:3 schedule, reverting to 1:6 once the conditions of the MOA are met.

Changes for 2014:

There are no changes planned for 2014.

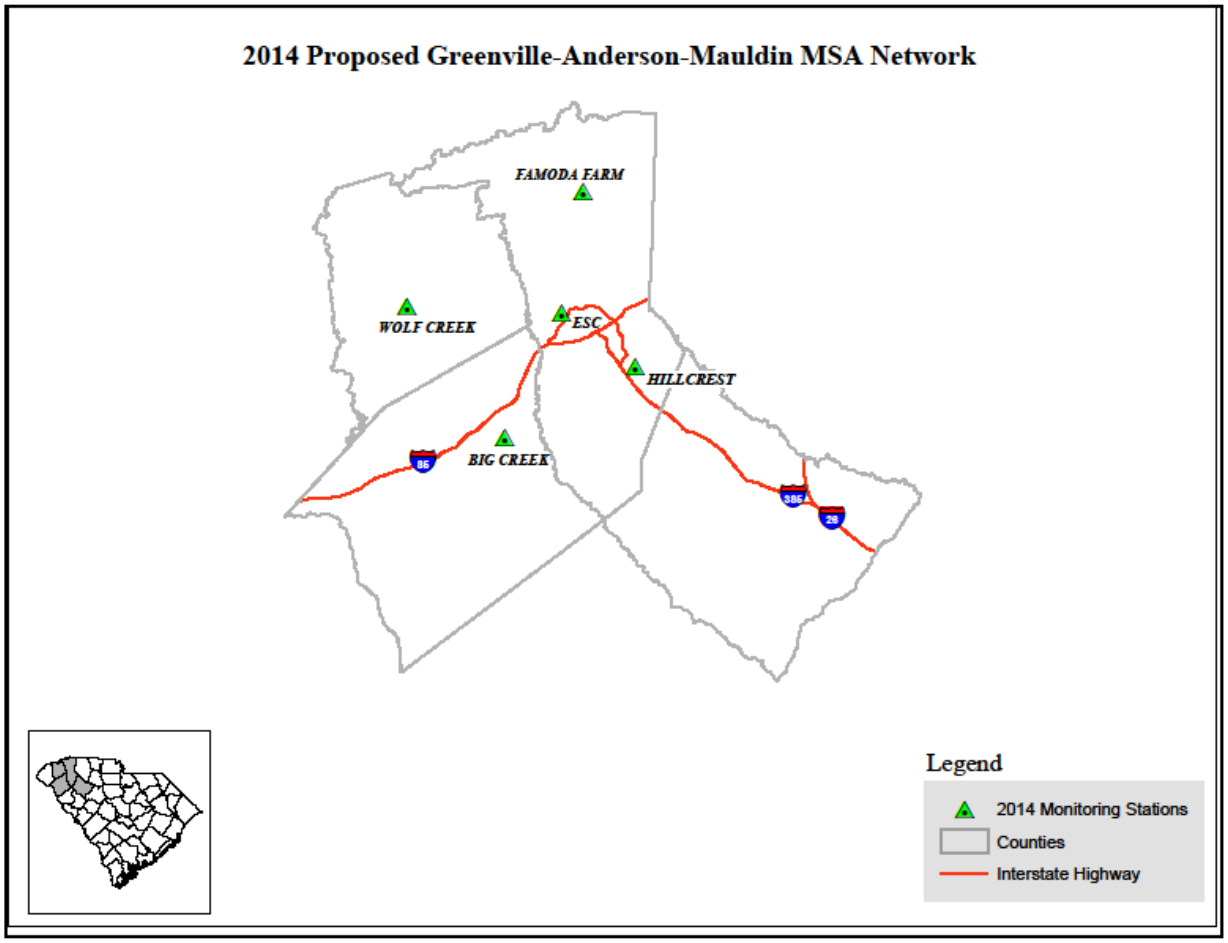
Monitors:

Site ID	Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency*
041-8001	Lead	Middle	Source oriented	SPM	2.4	GFAA	1:6
041-8002	Lead	Middle	Source oriented	SPM	2.5	GFAA	1:6
041-8003	Lead	Middle	Source oriented	SPM	2.5	GFAA	1:6

* Sampling frequency no less than1:6

[7] http://www.scdhec.gov/environment/JCI/docs/JCI-Settlement%20Agreement_07142010.pdf

Greenville-Anderson-Mauldin MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead /TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-007-0005	Big Creek						●												
45-045-0015	Greenville ESC	●	O	O	●			O	O		O	O							O
45-045-0016	Hillcrest	●●					●												
45-045-1003	Famoda Farm						●												
45-077-0003	Wolf Creek						O												
	TOTAL	3	1	1	1	0	4	1	1	0	1	1	0	0	0	0	0	0	1

O SPM / Other
● SLAMS
●●/OO indicates duplicate / QA samplers

Big Creek
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA
AQS Site ID: 45-007-0005
Location: 215 McAlister Road
County: Anderson
Coordinates: 34.623236, -82.532059
Date Established: June 6, 2008
Site Evaluation: PENDING (QA Check: December 4, 2012).

The Big Creek site is located northeast of the City of Anderson. The site was established to represent maximum ozone concentrations in the Anderson MSA downwind of Anderson and upwind background for the Greenville MSA. In February 2013, the MSA definitions were changed and this site is now contained within the Greenville-Anderson-Mauldin MSA.

Initiated in 2008, this site was part of the Greenville MSA Ozone study.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration / Upwind Background	SLAMS	4.24	FEM Ultraviolet Photometry	Continuous

Greenville Employment Security Commission (ESC)
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA
AQS Site ID: 45-045-0015
Location: 133 Perry Avenue
County: Greenville
Coordinates: +34.853985, -82.412754
Date Established: April 11, 2008
Site Evaluation: PENDING (QA Check: May 02, 2008).

The Greenville Employment Security Commission (ESC) site was established on April 11, 2008. This site supports a FRM $PM_{2.5}$ sampler and a continuous FEM TEOM monitoring for $PM_{2.5}$. It also supports speciated $PM_{2.5}$, PM_{10}, sulfur dioxide, nitrogen dioxide, sulfate, black carbon and measurements for wind speed and wind direction. The sample inlets are 15.0 meters from the nearest road.

The USEPA Region 4 Administrator has selected this site as one of the Regional Administrator selected NO_2 sites required by 40 CFR, Part 58, Appendix D, Section 4.3.4.

Changes for 2014:

Carbon monoxide monitoring was discontinued in July, 2012.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Population Exposure / Welfare Related Impacts	SLAMS	3.5	FRM Gravimetric	1:1
$PM_{2.5}$	Neighbor-hood	Population Exposure Welfare Related Impacts Required FEM Collocation	SPM non-regulatory	3.5	TEOM	Continuous
Speciated $PM_{2.5}$	Neighbor-hood	Population Exposure	Supplementary speciation	4.5	CSN Protocol	1:6
PM_{10}	Neighbor-	Population	SLAMS	4.0	FEM TEOM	Continuous

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
	hood	Exposure				
Sulfur Dioxide	Neighbor-hood	Population Exposure	SPM	4.0	FEM UV fluorescence	Continuous
Nitrogen Dioxide	Neighbor-hood	Population Exposure	SPM	4.0	FRM Chemilumines cence	Continuous
Sulfate	Neighbor-hood	Population Exposure / General Background	non-regulatory	4.5	Catalytic thermal reduction / Pulsed fluorescence	Continuous
Black Carbon	Neighbor-hood	Population Exposure / General Background	non-regulatory	4.5	Optical absorption	Continuous
Wind Speed / Direction	Neighbor-hood	Local Conditions	Not applicable	10	Instruments for wind speed and wind direction	Continuous

Hillcrest Middle School
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Maudlin MSA
AQS Site ID: 45-045-0016
Location: 510 Garrison Road
County: Greenville
Coordinates: 34.751848, -82.256701
Date Established: February 17, 2009
Site Evaluation: PENDING (QA Check: September 15, 2009).

This site was selected as a monitoring location based on results of the Greenville MSA Ozone study. Initiated in 2008, this site represents suburban areas near the interstate corridors in the Greenville MSA. This site also supports a FRM $PM_{2.5}$ sampler and a continuous $PM_{2.5}$ monitor.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Urban	Population Exposure	SLAMS	3.7	FRM Gravimetric	1:1
Collocated $PM_{2.5}$	Urban	Population Exposure	QA Collocated	3.7	FRM Gravimetric	1:6
Ozone	Urban	Population Exposure	SLAMS	4.1	FEM Ultraviolet Photometry	Continuous

Famoda Farm

CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Maudlin MSA
AQS Site ID: 45-045-1003
Location: 7401 Mountain View Road
County: Greenville
Coordinates: 35.057395, -82.372881
Date Established: October 24, 1969
Site Evaluation: PENDING (QA Check: October 05, 2009).

The Famoda Farm site was originally established in 1969 and operated until 1982. In 2008, this site was reactivated as part of the Greenville MSA Ozone study, which was designed to investigate ozone concentration variability across the Upstate by providing information to help refine the monitoring network to better meet monitoring objectives. The site has been retained to represent rural ozone impacts downwind of the Anderson and Greenville urbanized areas

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	2.0	FEM Ultraviolet Photometry	Continuous

Wolf Creek
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA
AQS Site ID: 45-077-0003
Location: 901 Allgood Bridge Road
County: Pickens
Coordinates: +34.851537, -82.744576
Date Established: August 10, 2010
Site Evaluation: QA Check: October 23, 2012

The Wolf Creek site is located in central Pickens County and was established to gain an understanding of ambient ozone concentrations in central Pickens County.

Data from the Wolf Creek site has been collected and compared to Clemson CMS site (45-077-0002) to determine the more appropriate location to represent ozone concentrations in this area of the CSA. At that time, DHEC chose to retain the Wolf Creek site as an element of the area monitoring network. In 2013, Anderson County was reincorporated into a Greenville-Anderson- Mauldin MSA, which changed the required number of ozone monitors for the area. DHEC will continue to evaluate the Greenville-Spartanburg-Anderson CSA network to determine the configuration of ozone monitors that most appropriately represents ozone concentrations in the area.

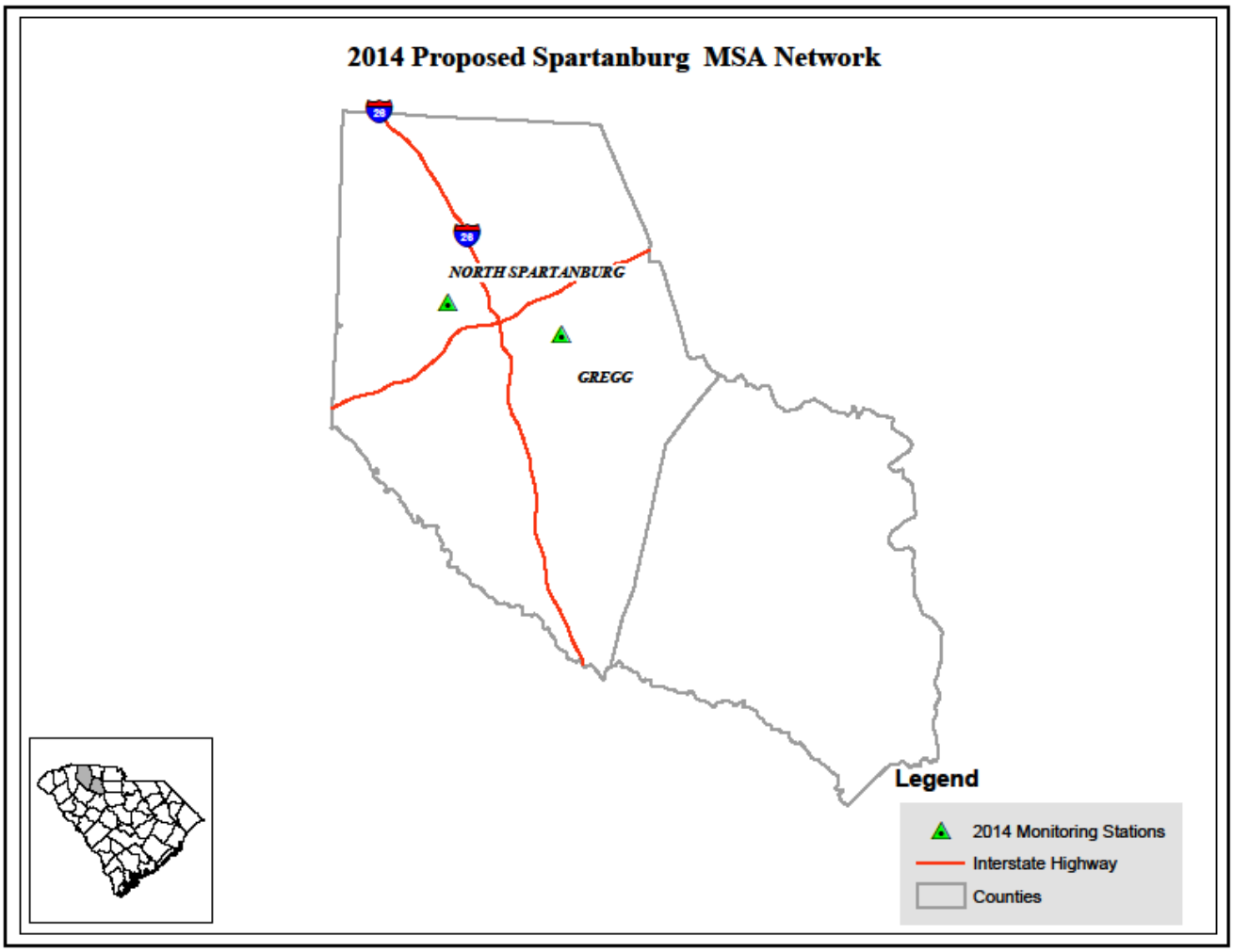
Changes for 2014:

No changes for 2014. DHEC continues to evaluate the Greenville MSA ozone network to determine the configuration of ozone monitors that most appropriately represent ozone concentrations across the area.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SPM	2.77	FEM Ultraviolet Photometry	Continuous

Spartanburg MSA



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead /TSP	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-083-0009	North Spartanburg Fire Station #2						●												
45-083-0011	T.K. Gregg	●																	
	TOTAL	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0

O SPM / Other
● SLAMS
●●/OO indicates duplicate / QA samplers

North Spartanburg Fire Station #2
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Spartanburg MSA
AQS Site ID: 45-083-0009
Location: 1556 John Dodd Road
County: Spartanburg
Coordinates: +34.988706, -82.075802
Date Established: April 4, 1990
Site Evaluation: The most recent site evaluation was conducted on June 8, 2006 (QA Check: May 02, 2008).

This monitoring site is located in rural Spartanburg County, northwest of the City of Spartanburg. This site was established as a maximum ozone concentration monitor for the Greenville-Spartanburg-Anderson urban area on April 4, 1990. This monitor is designated SLAMS and fulfills the requirement for a maximum concentration site for the Spartanburg MSA.

The sample inlets are 85.0 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Max Ozone Concentration	SLAMS	3.6	FEM Ultraviolet Photometry	Continuous

T.K. Gregg Recreation Center
CSA/MSA: Greenville-Spartanburg-Anderson CSA / Spartanburg MSA
AQS Site ID: 45-083-0011
Location: 267 Northview Street
County: Spartanburg
Coordinates: 34.95556, -81.924797
Date Established: December 29, 2008
Site Evaluation: PENDING (QA Check: September 16, 2009).

With the cooperation of local government and stakeholders, DHEC established this $PM_{2.5}$ site in the downtown Spartanburg area to meet the 40 CFR Part 58 Appendix D requirements for monitoring objective and collocated continuous monitoring and reporting. This site also supports the required collocated $PM_{2.5}$ continuous monitor for the Spartanburg MSA.

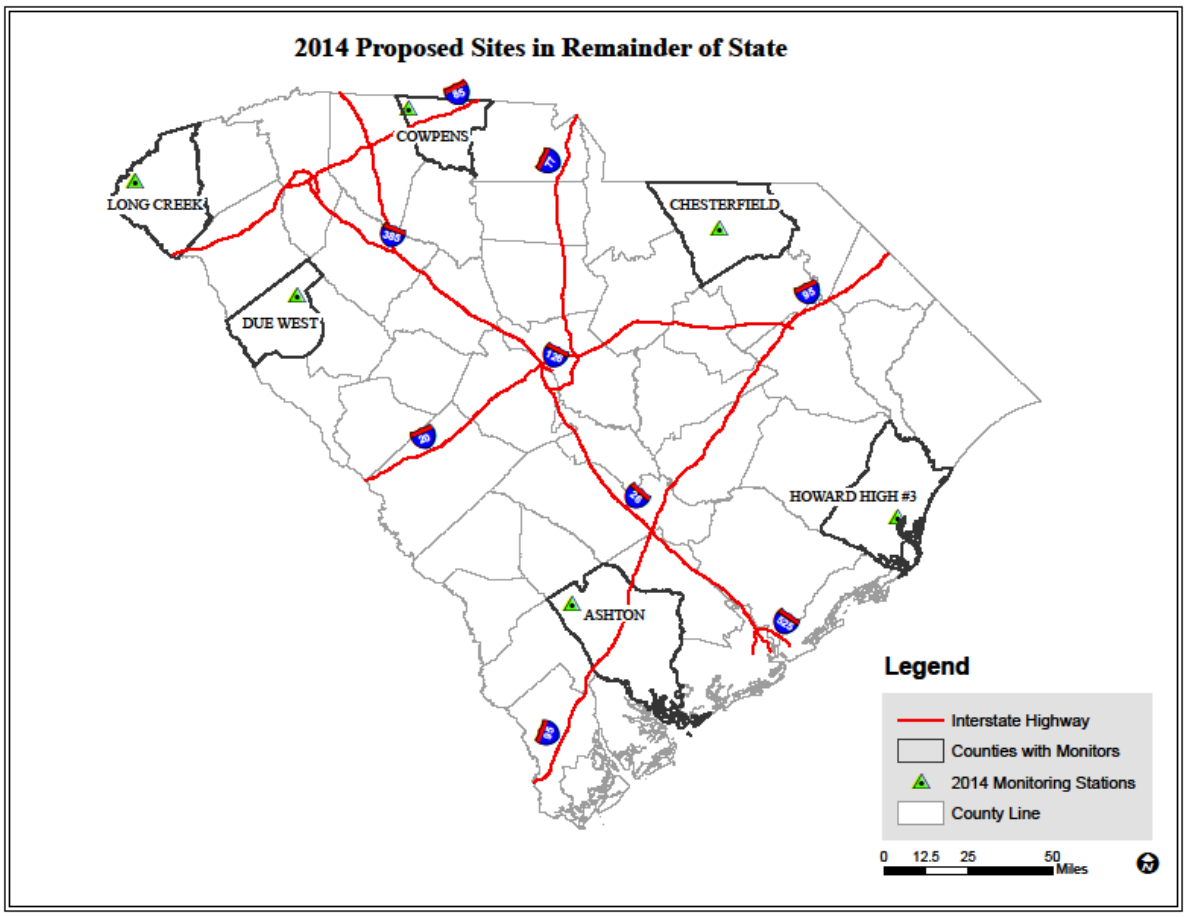
Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Neighbor-hood	Highest Concentration	SLAMS	2.5	FRM Gravimetric	1:1

Remainder of State



Classification of Monitoring Type by Site

AIRS ID	Site Name	$PM_{2.5}$	$PM_{2.5}$ Cont.	Speciation	PM_{10}	Lead	O_3	SO_2	NO_2	CO	Sulfate	BC	Carbonyls	SVOC	VOCs	Mercury	Precip Chem.	Precip.	MET
45-001-0001	Due West						●										○	○	
45-021-0002	Cowpens						○										○		
45-025-0001	Chesterfield	●	○	○	○○		○					○	○	○	○				○
45-029-0002	Ashton		●				●												
45-043-0011	Howard High School #3				○														
45-073-0001	Long Creek		○				○	○										○	
	TOTAL	1	3	1	3	0	5	1	0	0	0	1	1	1	1	0	2	2	1

○ SPM / Other
● SLAMS
●●/○○ indicates duplicate QA monitors

Due West
CSA/MSA: Greenville-Spartanburg-Anderson CSA/ None
AQS Site ID: 45-001-0001
Location: 59 Jim Scott Lane
County: Abbeville
Coordinates: +34.325318, -82.386376
Date Established: April 2, 1991
Site Evaluation: The most recent site evaluation was conducted on June 27, 2006 (QA Check: April 01, 2008).

The Due West site is located in northeastern Abbeville County. In addition to monitoring for ozone, Due West has a gauge for precipitation and a sampler for precipitation chemistry.

The sample inlets are 76 meters from the nearest road.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General / Background	SLAMS	4.0	FEM Ultraviolet Photometry	Continuous
Precipitation Chemistry	Regional	Trends	non-regulatory	1.5	IC	Weekly
Precipitation	Neighbor-hood	Local Conditions	non-regulatory	3.0	Tipping bucket	Continuous

Cowpens
CSA/MSA: Greenville-Spartanburg-Anderson CSA/ None
AQS Site ID: 45-021-0002
Location: McGinnis Road (Old SC 110)
County: Cherokee
Coordinates: +35.130396, -81.816567
Date Established: March 25, 1988
Site Evaluation: The most recent site evaluation was conducted on June 26, 2006 (QA Check: May 02, 2008).

The Cowpens site is located in northwestern Cherokee County at the Cowpens National Battlefield. Cowpens is sited to represent ozone concentrations between the Greenville-Spartanburg-Anderson CSA and the Charlotte-Gastonia-Salisbury CSA. The operation of the ozone monitor fulfills the ambient monitoring commitment in the Cherokee County Maintenance Plan.[10] In addition to ozone, the Cowpens site also supports a precipitation chemistry sampler. The sample inlets are 23.0 meters from the nearest road.

The monitor will be operated through the 2014 ozone season to fulfill the Cherokee County Maintenance Plan commitments.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	Upwind / Background	SPM	3.0	FEM Ultraviolet Photometry	Continuous
Precipitation Chemistry	Regional	Regional Transport	SPM	1.5	IC	Weekly

[10] 110(a)(1) Maintenance Plan: 8-hour Ozone National Ambient Air Quality Standard, Cherokee County, South Carolina, December, 2007.

Chesterfield (NATTS)
CSA/MSA: none/none
AQS Site ID: 45-025-0001
Location: SC145, McBee (Rt 2 Box 100)
County: Chesterfield
Coordinates: +34.615367, -80.198787
Date Established: January 6, 2000
Site Evaluation: The most recent site evaluation was conducted on April 21, 2003 (QA Check: June 9, 2011).

The Chesterfield site is located in central Chesterfield County. The Chesterfield site has continuous monitors for black carbon, $PM_{2.5}$, ozone and meteorological parameters. Sampling is done for $PM_{2.5}$, speciated $PM_{2.5}$ and PM_{10}. This site also serves as the required regional transport site for $PM_{2.5}$. In addition to the CSN protocol $PM_{2.5}$ speciation sampling, this site is a precision site with collocated FRM samplers for $PM_{2.5}$ and PM_{10}. The sample inlets are 45 meters from the nearest road. The Chesterfield site is a rural National Air Toxics Trends Site (NATTS) which includes carbonyls, VOC, SVOC and metals sampling.

Changes for 2014:

There are no changes planned for 2014.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Regional	Regional Transport	SLAMS	3.0	FRM Gravimetric	1:3
$PM_{2.5}$	Regional	Regional Transport	SPM non-regulatory	3.0	TEOM – 50° C	Continuous
Speciated $PM_{2.5}$	Regional	Regional Transport	CSN	3.0	Energy dispersive XRF, Ion chromatography, CSN TOT	1:6
PM_{10}	Regional	General / Background	SPM	3.0	Gravimetric ICP/MS	1:6
Collocated PM_{10}	Regional	General / Background	QA Collocated	3.0	Gravimetric	1:6

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Regional	General / Background	SPM	2.0	FEM Ultraviolet Photometry	Continuous
Black Carbon	Neighborhood	General / Background	non-regulatory	4.5	Optical absorption	Continuous
Carbonyls	Regional	NATTS	non-regulatory	3.0	DNPH/IC	1:6
SVOC	Regional	NATTS	non-regulatory	3.0	PUF/GCMS	1:6
Volatile Organic Compounds	Regional	NATTS	non-regulatory	3.0	Canister/GCMS	1:6
Wind speed / direction	Neighborhood	Local Conditions	non-regulatory	10.0	Instruments for wind speed and direction	Continuous

Ashton
CSA/MSA: none/none
AQS Site ID: 45-029-0002
Location: Ashton Road (S-13-18)
County: Colleton
Coordinates: +33.007866 -80.965038
Date Established: March 7, 1990
Site Evaluation: The most recent site evaluation was conducted on April 18, 2005 (QA Check: May 19, 2011).

The Ashton site is located in northwestern Colleton County and was established on March 7, 1990. The site serves as a required regional background for $PM_{2.5}$, representing one of two major and different physiographic regions in South Carolina. In 2014, the $PM_{2.5}$ monitor designation was changed from SPM to SLAMS. It also monitors ozone concentrations. The sample inlets are 8 meters from the nearest road.

Changes for 2014:

Designation type for $PM_{2.5}$ will be changed to SLAMS to reflect status of being the required regional background site.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Regional	General / Background	SLAMS	4.0	TEOM 50°C	Continuous
Ozone	Urban	General / Background	SLAMS	4.0	FEM Ultraviolet Photometry	Continuous

Howard High School #3
CSA/MSA: Myrtle Beach-Conway SC,NC CSA/none
AQS Site ID: 45-043-0011
Location: 594 Gilbert Street
County: Georgetown
Coordinates: 33.368916,-79.296617
Date Established: July, 15 2008
Site Evaluation: PENDING (QA Check: April 21, 2011).

This site represents a continuation of PM_{10} monitoring in this area of Georgetown that has been ongoing since 1970 and the establishment of the original Howard High site.

Changes for 2014:

No changes are planned for 2014.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
PM_{10}	Neighbor-hood	Population Exposure Highest Concentration	SPM	2.3	TEOM	Continuous

Long Creek

CSA/MSA: Greenville-Spartanburg-Anderson CSA/ none
AQS Site ID: 45-073-0001
Location: Round Mt. Fire Tower
County: Oconee
Coordinates: +34.805261, -83.237700
Date Established: August 1, 1983
Site Evaluation: The most recent site evaluation was conducted on February 18, 2005 (QA Check: December 4, 2012).

The Long Creek monitoring site is located on Round Mountain in northwest Oconee County. The Long Creek site was also established as part of the Southern Oxidant Study. It provides a unique vantage for monitoring the impacts of transported pollutants. Long Creek has continuous monitors for ozone, $PM_{2.5}$, sulfur dioxide and precipitation. The sample inlets are 11.0 meters from the nearest road.

Due to the importance of measuring region-wide sulfur dioxide, $PM_{2.5}$ and ozone concentrations, the unique location and collocated monitoring activity, DHEC has determined that current monitoring at this site should be continued.

Changes for 2014:

DHEC intends to continue to work with the land-owner to improve site exposure due to recent tree growth around the site. The designation for the $PM_{2.5}$ monitor was changed from SLAMS to SPM due to inadequate performance of the FEM at this location.

Monitors:

(Table continues on next page)

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
$PM_{2.5}$	Urban	General / Background	SPM non-regulatory	4.15	FEM TEOM	Continuous
Ozone	Regional	General / Background	SPM	4.22	FEM Ultraviolet Photometry	Continuous
Sulfur Dioxide	Regional	Regional Transport	SPM	4.3	FEM UV fluorescence	Continuous
Precipitation	Neighbor-hood	Local Conditions	non-regulatory	1.5	Tipping bucket	Continuous

Discontinued Sites

Clemson CMS

CSA/MSA: Greenville-Spartanburg-Anderson CSA / Greenville-Anderson-Mauldin MSA
AQS Site ID: 45-077-0002
Location: 106 Hope Well Road
County: Pickens
Coordinates: +34.653606, -82.838659
Date Established: July 14, 1979
Site Evaluation: The most recent site evaluation was conducted on March 18, 2003 (QA Check: October 23, 2012).

The Clemson Continuous Monitoring Site (CMS) site was located on the grounds of Clemson University near the western border of Pickens County. This monitor measured ozone concentrations upwind of the Greenville-Spartanburg urbanized area. The sample inlets are 27.4 meters from the nearest road.

This site was part of the Greenville MSA Ozone study, initiated in 2008 and designed to investigate ozone concentration variability across the Upstate and provide information to help refine the monitoring network to better meet monitoring objectives.

Changes for 2014:

DHEC collected sufficient data at the Clemson CMS, Big Creek and Wolf Creek sites to demonstrate the adequacy of the monitoring network, without the Clemson data, to represent the area. . After evaluating the data, DHEC determined that the Wolf Creek site was the more appropriate location to represent ozone concentrations for this portion of the MSA. Appendix B provides detailed justification for monitoring termination.

Monitors:

Parameter	Scale	Objective	Designation	Probe Height (m)	Analysis Method	Sampling Frequency
Ozone	Urban	General background	SLAMS	3.5	FEM Ultraviolet Photometry	Continuous

Network Development

The Monitoring Network provides data to support an array of decisions ranging from development of emissions strategies to protect and improve air quality to the level of activity appropriate for individuals in sensitive populations. To support these varied data users, the network must provide both stable long term measures to document trends and rapid reporting of conditions to the public. In response to land use, population and urban areas growth, the network must be evaluated and adjusted to meet the changing conditions and needs.

The Monitoring Network described in this plan continues to build upon a significant transition from the network that has evolved over the last thirty-five years. It reflects the successes in reducing ambient concentrations of Total Suspended Particulate, lead, carbon monoxide, nitrogen oxides and sulfur dioxide and the increasing concern about the impact of fine particles and ozone on public health and the environment.

A series of studies are planned for the major urban areas as resources permit to gain better understanding of the air quality and provide information to improve the monitoring network. In addition to the intensive studies that provide a detailed 'snapshot,' it is intended that SPM sites be established and monitored in rotation to provide regular checks and long term tracking of the trends in air quality in all areas of the state including smaller cities, towns and rural areas. The implementation of this long term strategy is contingent on sufficient federal funding to support the core required monitoring and will be developed and evaluated as resources become available. Project plans will be developed for the monitoring and data analysis activity to better define the scope of these strategies prior to implementation. These studies are long term needs DHEC has identified and are important tools for evaluating and improving the representativeness of the ambient monitoring network and our knowledge of air quality in the State.

Areas where long term strategies are being considered include:

- Columbia MSA Ozone Study - addition of supplementary SPM ozone sites to investigate variability and refine the monitoring network to meet monitoring objectives.
- Columbia MSA Particulate Surveillance - rotation of SPM $PM_{2.5}$ sites through areas with higher rates of growth and changes in land use to determine trends and understand spatial variability of concentrations (Parklane, Sandhill and potentially Lower Richland, Lexington and Chapin).
- Aiken County portion of the Augusta-Richmond County MSA Ozone Study - addition of supplementary SPM ozone site to investigate proper size of the network appropriate to represent the South Carolina portion of the MSA.
- Aiken County portion of the Augusta-Richmond County MSA Particulate Study – investigation of $PM_{2.5}$ concentrations in North Augusta and Aiken along with existing rural data to determine population exposure and possible need for monitoring of mass or the components of particulate to assist in area air quality improvement efforts.
- York County Ozone Study - limited investigation of ozone population exposure, spatial variability and transport to supplement existing North and South Carolina monitoring. Study began in the Summer, 2012 and includes two additional ozone monitoring sites within York County. This study is expected to be conducted through the 2013 ozone monitoring season.
- Near road NO_2 Monitoring Network Implementation-the 2010 Primary National Ambient Air Quality Standards for Nitrogen Dioxide and the 2013 Revision to Ambient Nitrogen Dioxide Monitoring Requirements requires each CBSA having 1,000,000 or more persons to have one near-road NO2 monitor operational by January 1, 2014 and each CBSA having 500,000 or more persons (but less than 1,000,000), to have one near-road NO2 monitor operational by January 1, 2017. DHEC, in conjunction with local stakeholders, will apply the methodology found in The

Near Road NO_2 Monitoring Technical Assistance Document, identify an appropriate list of road segments, and propose these sites to EPA.

- Myrtle Beach-Conway-North Myrtle Beach SC, NC MSA Ozone and SO_2 monitoring-in February, 2013, OMB added Brunswick County, North Carolina to the Myrtle Beach-Conway-North Myrtle Beach SC, NC MSA, which resulted in this MSA being required to have one Ozone monitor and one SO_2 monitor. DHEC, in conjunction with North Carolina, will work with internal and external partners to identify and propose appropriate sites to EPA.
- Charleston Port Monitoring-the Charleston Port Expansion project has a projected completion data of 2017-2019. At that time, DHEC will work with local stakeholders to identify and establish an appropriate $PM_{2.5}$ site.
- Charleston MSA Ozone study - Investigation of alternative ozone monitoring sites to better represent ambient ozone concentrations in the Charleston – North Charleston MSA potentially replacing Bushy Park (45-015-0002).

APPENDIX A: Errata

This section will list corrections to the 2014 Monitoring Plan that may arise after submittal to the EPA. The updated plan along with this errata sheet will be posted to DHEC's webpage.

Date	Item

APPENDIX B: Justification for terminating Clemson CMS

Introduction

In order to support the refinement of the ozone monitoring network in the Upstate of South Carolina (encompassing the current Greenville-Anderson-Mauldin and Spartanburg Metropolitan Statistical Areas) the Department of Health and Environmental Control (DHEC) added additional monitors to improve the spatial coverage and has conducted an analysis of all ozone monitoring data collected from the existing and additional monitors (Figure 1). Table 1 lists the site name, site ID, county, page in the 2013 Monitoring Plan that contains the purpose of the site and date ozone monitor was established for those monitors in the Greenville MSA Ozone Study identified in the 2013 Plan.

Recognizing that maintenance of large monitoring networks in the face of ever increasing budget cuts is no longer possible or practical, the SC Air Program conducted a significant review of the Ambient Monitoring network in 2007. DHEC has made it a priority to eliminate redundant or low value monitors, even at the cost of ending long-term monitoring records, in order to have sufficient resources to meet the mandatory monitoring requirements and data collection needed to adequately operate the program. While DHEC understands the importance of maintaining a long term monitoring record, ensuring that an area is appropriately monitored in the most efficient manner is the priority for our monitoring program.

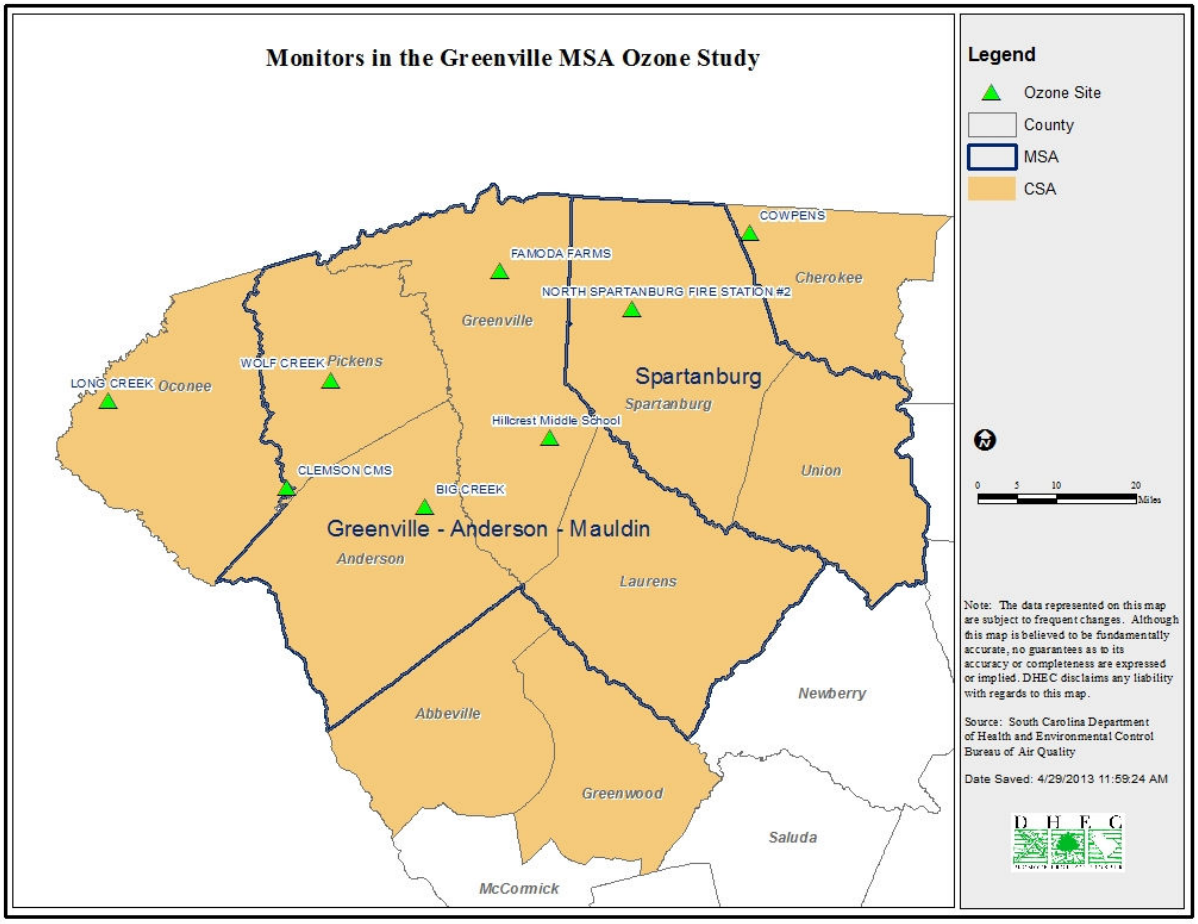
DHEC seeks concurrence to terminate monitoring at Clemson CMS (45-077-0002) as requested in the 2014 Network Description and Ambient Air Network Monitoring Plan in order to eliminate duplicative monitoring in the Greenville-Anderson-Mauldin Metropolitan Statistical Area (MSA). The Clemson CMS (45-077-0002) monitoring site no longer has the highest ozone design value site in the MSA. DHEC may propose further modifications to the ozone network in the Upstate in subsequent Plans to best use resources and ensure that an efficient, adequate monitoring network is maintained.

DHEC recognizes that the explicit requirements of 40 CFR 58.14, paragraph c (System Modification) for discontinuation of a State/Local Air Monitoring Station (SLAMS) are not met for the Clemson CMS monitor. However, the System Modification requirement states "Other requests for discontinuation may be approved on a case-by-case basis if discontinuance does not compromise data collection needed for implementation of a NAAQS and if the requirements of Appendix D to this part, if any, continue to be met." DHEC provides evidence below that the continued operation of existing monitors in the Greenville-Anderson-Mauldin MSA provide the appropriate data collection needed for implementation of the Ozone NAAQS. The minimum monitoring requirements specified in Appendix D will continue to be met or exceeded for the MSAs. Table 1 lists how the area monitors, as proposed, meet or exceed the minimum monitoring requirements found in Appendix D to 40 CFR Part 58. The Monitoring rule repeatedly reinforces that the Regional Administrator and the responsible monitoring agency must work together to design and maintain the most appropriate network to meet the data needs of the area.

Table 1: Listing of monitors used in this analysis

Site Name	Site ID	County	2012 Ozone Design Value (ppb)	Fulfills or exceeds Appendix D requirements (MSA)	Date Established	Page in 2013 Monitoring Plan
Long Creek	45-073-0001	Oconee	64	Exceeds Not in MSA <350,000 pop.	5/4/1989	66
Wolf Creek	45-077-0003	Pickens	67*	Exceeds Greenville-Anderson-Mauldin MSA	8/10/2010	55
Clemson CMS	45-077-0002	Pickens	71	----	7/20/1979	67
Famoda Farm	45-045-1003	Greenville	66	Meets Greenville-Anderson-Mauldin-MSA	8/7/2008	54
Hillcrest	45-045-0016	Greenville	69	Meets Greenville-Anderson-Mauldin MSA	3/4/2009	53
Big Creek	45-007-0005	Anderson	73	Exceeds Greenville-Anderson-Mauldin MSA	6/6/2008	50
North Spartanburg	45-083-0009	Spartanburg	75	Meets Spartanburg MSA	4/10/1990	57
Cowpens	45-021-0002	Cherokee	70	Meets Gaffney Ozone Maintenance	4/21/1988	61
*Denotes monitor did not meet minimum monitoring completeness criteria.						

Figure 1: Map of monitors in the Greenville MSA Ozone Study



Background on Monitoring Configuration in the Upstate

The monitoring configuration of the 'legacy' monitoring sites operating in 2007 in the Upstate of South Carolina (west to east: Long Creek Clemson, North Spartanburg and Cowpens) predates the Greenville MSA Ozone study referenced below. Prior to the study, the Greenville - Spartanburg - Anderson MSA consisted of Greenville, Spartanburg, Anderson, Pickens and Cherokee Counties[11]. The configuration of monitors at that time included Clemson (45-077-0002: Pickens County), Long Creek (45-073-0001: Oconee County) and Powdersville (45-007-0003: Anderson County discontinued Nov 2006) sites as monitors representing upwind concentrations for the MSA, while North Spartanburg (45-083-0009: Spartanburg County) and to some extent Cowpens (45-021-0002: Cherokee County) representing expected maximum downwind concentrations for the then current MSA configuration.

In October, 2006, the United States Environmental Protection Agency (EPA) published ambient monitoring regulations[12] containing revisions to quality assurance (QA), monitor designations, minimum requirements for both number and distribution of monitors among MSAs and probe siting. The regulation also included the requirement for an annual monitoring network plan and periodic network assessments.

[11] http://www.census.gov/population/metro/files/lists/historical/99mfips.txt
[12] 71 FR 61236, October 17, 2006

In June 2003[13], the Office of Management and Budget (OMB) redefined the MSA definitions for the Upstate of South Carolina separating the former single Greenville-Spartanburg-Anderson MSA into three distinct MSAs. The breakup of the original MSA into three distinct areas and the 2006 revision to the regulations triggered new minimum monitoring requirements for each independent MSA based on the Chapter 40, Appendix D to Part 58 of the Code of Federal Regulations. Despite this change in the monitoring requirements driven not by air quality planning needs, but in large part by arbitrary and dynamic boundaries delineated by the Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics, DHEC believes that a monitoring network based on the original configuration is most appropriate to capture the evolution and transport of ozone in the area and indicate population exposure across the upstate during typical elevated ozone episodes. The generally east to west configuration of the network mirrors the airflow along the foot of the Appalachians, the successive inputs of precursor emissions from the urbanized areas, and provides data useful for the public notification for the citizens in the Upstate and the development of appropriate air management policy.

Monitoring was added in Anderson County (Big Creek) to address the regulatory requirement for the newly designated Anderson MSA, but it was done in the context of the concern about the Clemson site location very close to the MSA boundary, the historical knowledge of the development and movement of ozone in the Upstate and the constellation of monitors being installed to support development of the most appropriate monitoring configuration for the region.

In February 2013, the Office of Management and Budget released new Metropolitan Statistical Area (MSA) definitions[14]. The new definitions recombined the Anderson MSA with the Greenville-Mauldin-Easley MSA forming the Greenville-Anderson-Mauldin MSA and using the minimum monitoring requirements , significantly more than the minimum number of monitors required for the area. The Clemson CMS (45-007-0002) site no longer has the highest ozone design value in the MSA. DHEC believes that the Greenville-Anderson-Mauldin MSA is adequately represented by the other existing monitoring sites in Greenville and Anderson counties.

OMB cautions users that "OMB establishes and maintains the definitions of Metropolitan and Micropolitan Statistical Areas … solely for statistical purposes. This classification is intended to provide nationally consistent definitions for collecting, tabulating, and publishing Federal statistics for a set of geographic areas."[15] Nowhere in the OMB bulletin does it suggest that the MSA definitions are appropriate for, or include important data elements applicable to, the definition of an ambient air monitoring network. While DHEC understands the need for establishing minimum monitoring requirements, EPA appropriately has mechanisms within the monitoring plan approval and network assessment process to allow states the flexibility to implement a monitoring network that meets the three basic monitoring objectives and addresses National and State needs. The recent whipsaw changes in the MSA definitions is an example of the reason for the incorporation of flexibility in the regulations and illustrates necessity that EPA use the discretion available in the monitoring regulations to afford states flexibility and regulatory certainty.

[13] Office of Management and Budget Bulletin No. 03-04, announcing metropolitan and micropolitan statistical areas as of June 6, 2003, based on application of the 2000 OMB standards to Census 2000 data, http://www.whitehouse.gov/omb/bulletins_b03-04.
[14] http://www.census.gov/population/metro/
[15] Office of Management and Budget Bulletin No. 03-04, announcing metropolitan and micropolitan statistical areas as of June 6, 2003, based on application of the 2000 OMB standards to Census 2000 data, http://www.whitehouse.gov/omb/bulletins_b03-04,.paragraph 4.

Clemson CMS Termination Request Background

In July 2007, DHEC submitted their first annually required[16] Network Description and Ambient Air Monitoring Plan (2008 Plan). In the 2008 Plan DHEC stated that monitoring at the Clemson CMS site (45-077-0002)[17] would be maintained through the 2008 ozone season as part of the Greenville MSA Ozone Study[18]. On October 24, 2007 EPA conditionally approved the establishment of two ozone monitoring sites as part of the Greenville MSA Ozone Study.

In 2008, DHEC designed and initiated the Greenville MSA Ozone study to investigate ozone concentration variability across the Upstate and provide information to help refine the monitoring network to better meet monitoring objectives. The study sites proposed to improve the spatial distribution of available data were not established as quickly as desired but monitoring has been maintained at the additional sites for several years beyond the expected duration of the study. DHEC has evaluated data from all of the previously existing and the supplementary monitors to arrive at a configuration of monitors and locations that best represent air quality and meets area monitoring objectives.

In July 2008, based on ozone data collected from 2005 – 2007, DHEC determined that it would terminate all monitoring at the Clemson CMS site (45-077-0002)[19], establish the Famoda Farm site (45-045-1003)[20] and establish a site in Southeastern Greenville County[21] in execution of the 2008 Plan. In their October 27, 2008 response, the US Environmental Protection Agency (EPA) denied the request to discontinue ozone monitoring at the Clemson site because "The sites above that are currently violating the NAAQS[22], cannot be terminated at this time. The monitor types for these sites must be changed back to SLAMS in AQS and they must operate for at least one additional calendar year to compare with new sites that SC DHEC is proposing to establish." On March 25, 2009 EPA submitted a follow-up letter as a confirmation of discussions between DHEC and EPA staff that listed the Clemson CMS ozone monitor as a site that is "eligible to be shutdown dependent on the establishment of new sites and the data comparisons."

On February 1, 2011 DHEC submitted an amendment to the 2011 Monitoring Plan establishing the Wolf Creek monitoring site. In the cover letter to the amendment, DHEC stated "We wish to add the Wolf Creek monitoring site (45-077-0003), near the town of Pickens, in central Pickens County, to the 2011 Annual Air Network Monitoring Plan. Stakeholders in Pickens County have voiced concerns that the data being collected at the Clemson CMS monitoring site (45-077-0002 SLAMS) is not representative of ozone concentrations in Pickens County. The Wolf Creek site is expected to be better representative of both Pickens County and the Greenville-Mauldin-Easley MSA ambient ozone concentrations. Ozone data from the Wolf Creek monitoring site will be collected concurrently with, and compared to data collected at the Clemson CMS site to allow an evaluation to determine if revision of the local ozone monitoring network is appropriate. The network revisions may include redesignation of Wolf Creek as one of the two required [Greenville-Mauldin-Easley]MSA SLAMS Ozone monitors and discontinuation of the Clemson site." The EPA subsequently approved this amendment to the 2011 Monitoring Plan in a letter dated March 14, 2011.

On June 4, 2012, DHEC submitted an amendment to the 2012 Monitoring Plan requesting approval to terminate the Clemson CMS (45-077-0002) monitoring site in Pickens County. Appendix D to 40 CFR Part 58 requires only two ozone monitors for the MSA based on current population and design values. At

[16] 40 CFR 58.10 (a)(1)
[17] State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2008 (2008 Plan) at page 21
[18] *Id*., at page 32
[19] State of South Carolina: Network Description and Ambient Air Network Monitoring Plan for Calendar Year 2009 (2009 Plan) at page 65
[20] *Id*., at page 23
[21] *Id*., at page 24
[22] On March 27, 2008, EPA finalized a revised Ozone NAAQS set at 0.075 ppm, 73 FR 16435.

that time, the Greenville-Mauldin-Easley Metropolitan Statistical Area (MSA) had four ozone monitoring stations in operation. Additional monitoring in the MSA established in 2008 and 2009 at Hillcrest (45-045-0016) and Famoda Farm (45-045-1003) provided what DHEC contends is representative data and ozone design values for the MSA. Termination of monitoring at Clemson CMS would have allowed DHEC to redirect limited resources to program priorities. EPA disapproved this request until there was enough data collected at each of the four Greenville-Mauldin-Easley MSA sites to calculate a design value.

We are not aware of any regulatory language that requires calculation of a Design Value at a replacement site prior to termination of an existing monitor. The regulations allow termination "…if discontinuance does not compromise data collection needed for implementation of the NAAQS and if requirements of Appendix D of this part, if any, continue to be met[23]."

Before and after the recent MSA definition changes, the Greenville-Anderson-Mauldin MSA continues to have more monitoring than is necessary to meet National and State Monitoring objectives. DHEC still believes that it is appropriate discontinue ozone monitoring at the Clemson CMS (45-077-0002) site. As stated elsewhere, due to the definition changes, the highest MSA design value site is now located at the the Big Creek (45-007-0005) site and EPA's original concern that DHEC is requesting termination of the MSA's design value site is now moot. As demonstrated below, DHEC believes that the Big Creek (45-007-0005) site is a more appropriate site than Clemson to represent ozone concentrations in this part of the Greenville-Anderson-Mauldin MSA.

Data Evaluation

Daily maximum 8-hour average ozone concentrations for 2010 – 2012 were analyzed for monitors in the Greenville Spartanburg CSA. Correlation coefficients (Table 2) indicate a high level of relationship between all monitors. The Clemson CMS site showed a very high level of correlation with Big Creek (45-007-0005) and Wolf Creek (45-077-0003) likely due to the proximity of the monitors to each other.

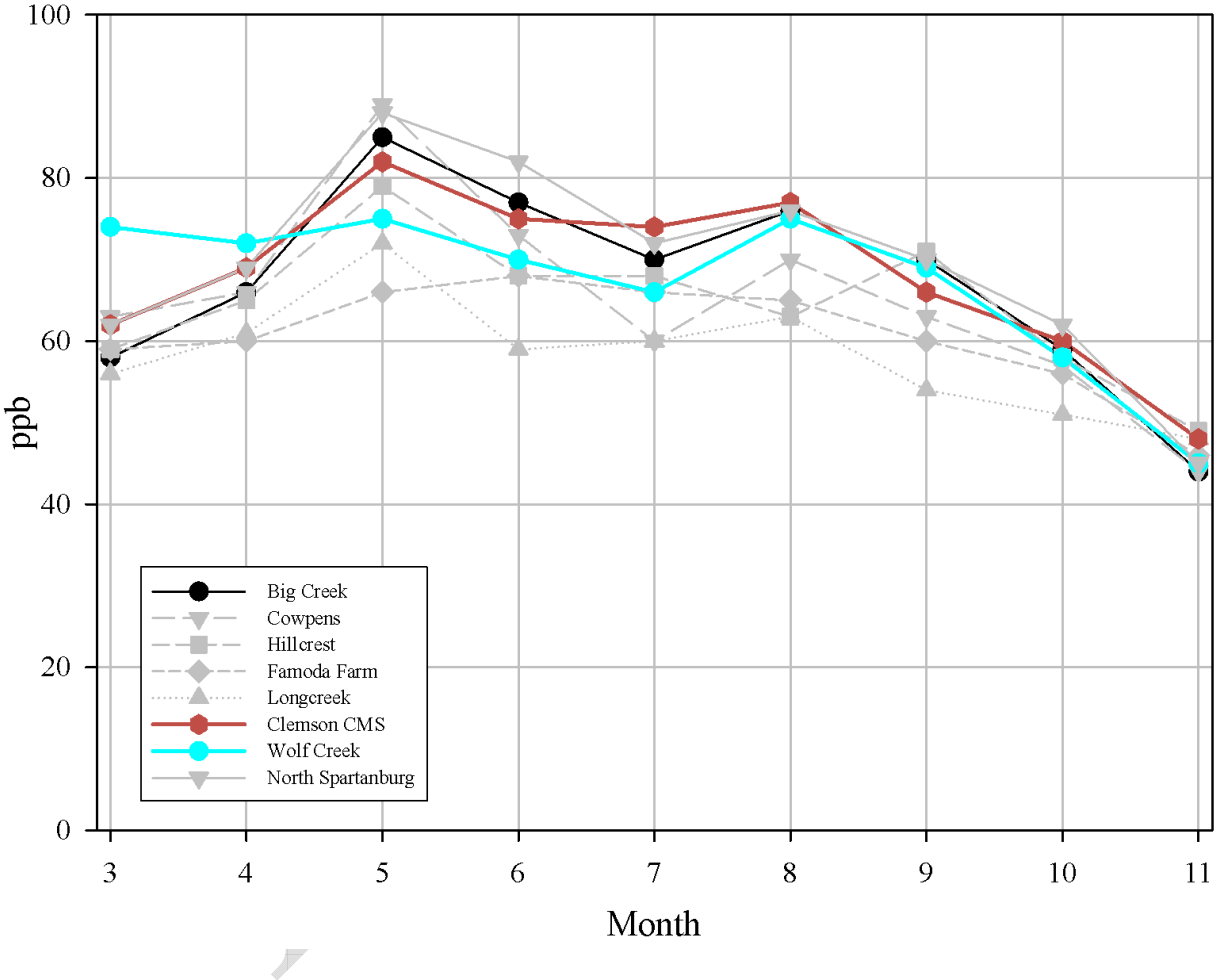
Table 2: Correlation coefficients for daily maximum 8-hour average ozone concentrations 2010 - 2012

	Big Creek	Cowpens	Hillcrest	Famoda Farm	Long Creek	Clemson	Wolf Creek	North Spartanburg
Big Creek	1							
Cowpens	0.882	1						
Hillcrest	0.890	0.845	1					
Famoda Farm	0.844	0.833	0.861	1				
Long Creek	0.722	0.757	0.712	0.813	1			
Clemson	0.925	0.853	0.871	0.890	0.799	1		
Wolf Creek	0.856	0.817	0.805	0.872	0.774	0.928	1	
North Spartanburg	0.898	0.907	0.874	0.856	0.732	0.886	0.837	1

[23] 40CFR §58.14 (c)

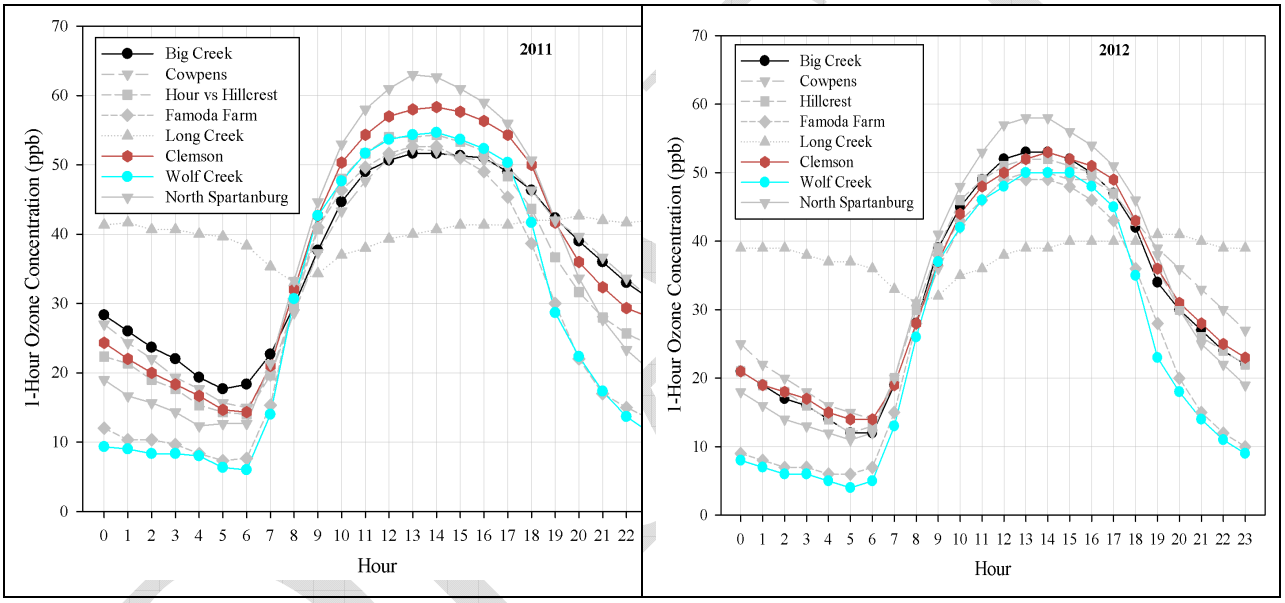
The highest daily maximum 8-hour ozone average concentrations during 2009 – 2011 were examined in order to ensure that the monitors exhibited similar behaviors in the highest values measured (Figure 2). As can be seen below the same general pattern occurred for all monitors except for the Long Creek site, which is a high elevation site and represents background/regional transport. The Big Creek, Clemson and Wolf Creek sites exhibited similar highest monthly daily maximums throughout the study period providing evidence that the monitors on the western edge of the CSA are measuring similar peak concentrations and that one or more of the monitors is redundant.

Figure 2: Upstate Highest Daily Maximum 8-Hour Average Concentrations by Month (2010 – 2012)



Since the analysis in Figure 2 indicated elevated peak ozone concentrations during the summer months, DHEC examined the summer months of 2011 (June – August) when all monitors in the study area were operating to see if all of the monitors exhibited similar average diurnal patterns in 1-hour concentrations. As can be seen in Figure 3, diurnal patterns are very similar for all monitors in the populated areas. The atypical Long Creek daily ozone variability is expected due to the relatively high elevation at that location. During the peak in the curve in Figure 3 (approximately hours 10 -19), it is evident that Big Creek and Clemson CMS are reading almost identical average concentrations suggesting that the Clemson CMS site does not provide unique data or information critical to implementation of the NAAQS in the MSA. A comparison of the previous summer's graph reveals that this pattern is consistent throughout the Upstate.

Figure 3: Comparison of Average Diurnal Pattern in 1-Hour Ozone Concentrations 6/1/2011 – 8/31/2011 (left graph) and 6/1/2012 – 8/31/2012 (right graph)

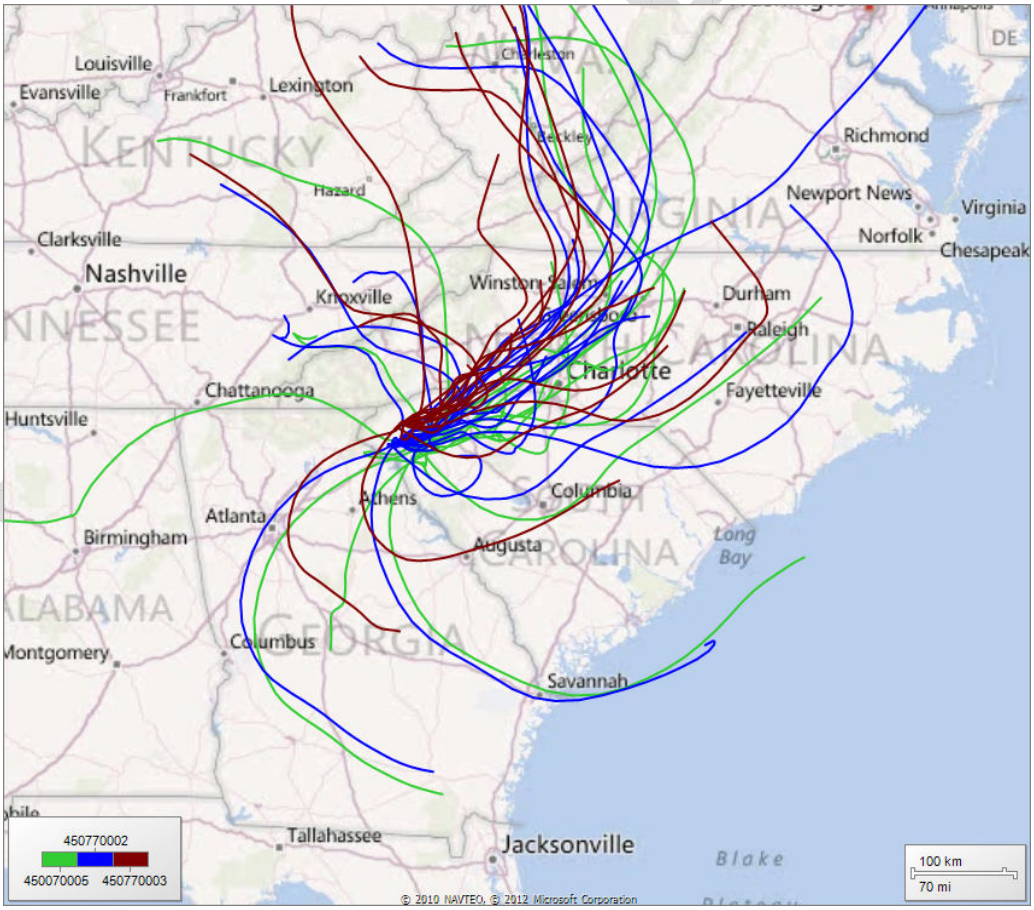


Trajectory Analysis

A trajectory analysis was conducted on all days during the summer of 2011 with daily maximum 8-hour ozone averages greater than 85% of the 2010 Ozone National Ambient Air Quality Standard (NAAQS) (Figure 4). Thirty-six hour back trajectories were run using the HYSPLIT (Hybrid Lagrangian Integrated Trajectory) model for Big Creek, Wolf Creek and Clemson CMS when the monitors exceeded 85% of the Ozone NAAQS. The backtrajectories were run using the North American Mesoscale Model (NAM) Data Assimilation System (EDAS) 40 kilometer grid at 300 meters beginning at 20 Coordinated Universal Time (UTC). A back trajectory allows the viewer to see where an air mass originated and where it travels before ending up at the impact location.

This analysis (Figure 4 presents the composite image of all trajectories examined) suggests that concentrations greater than 85% of the Ozone NAAQS exhibit similar transport regimes for the three monitors, supporting DHEC's position that all monitoring in this area of the CSA measures similar concentrations of ozone and that there are redundant monitors that can be terminated to conserve resources.

Figure 4: 36-Hour Backtrajectory Analysis for Big Creek (45-007-0005), Clemson (45-077-0002) and Wolf Creek (45-077-0003) on days that exceed 85% of the Ozone NAAQS 6/1/2011 – 8/31/2011



Conclusions

An analysis of daily maximum ozone concentrations, 1-hour ozone concentrations and 36-hour back trajectories on days with daily maximum concentrations greater than 85% of the Ozone NAAQS all show that the ozone monitors in current network configuration in and around the Greenville MSA are exposed to similar levels of pollution. Specifically, daily maximum 8-hour ozone concentrations at Big Creek and Clemson CMS and Wolf Creek are highly correlated, have similar temporal patterns in monthly maximum concentrations and exhibit very similar 1-hour peak concentrations during the summer months. Furthermore, on days that approach or exceed the level of the Ozone NAAQS, trajectory analysis suggests that three monitors are measuring concentrations in the same air mass, suggesting that there is redundant monitoring in this portion of Upstate of South Carolina. In light of this evidence and the current monitoring requirements, DHEC respectfully requests EPA concurrence to terminate ozone monitoring at the Clemson CMS (45-077-0002) site. Based on the data collected and data needs for the air program and area, DHEC may propose further refinements to the Upstate ozone monitoring network in future monitoring plans and or amendments to approved plans to better meet the monitoring objectives.